The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Industry Pamphlets

"Chemists and their Work," by Stephen Miall.
"The Quest for Colour," by A.T. de Mouilpied, B.Sc. (Lond.). M.Sc. (Vict.), Ph.D., F.I.C.
"Wood Products," by T. W. Jones, B.Sc.
"The Fermentation Industries," by Rex Furness.
"Fine Chemicals," by T. W. Jones, B.Sc.
"The Heavy Chemical Industry," by Rex Furness.
"Chemistry in the Manufacture of Pigments, Paints and Varnishes," by C. A. Klein, M.Sc.
"Food-stuffs," by G. W. Monier-Williams, D.Sc.
(London: Ernest Benn, Ltd. 1924. 6d. each net.)

IN a recent notice of *Chemistry in the Twentieth Century* there was a note of regret that the contents of that book would be so far out of the ken of the average educated citizen. It is gratifying, therefore, to be able to draw attention to this little series of sixpenny pamphlets which has been issued in supplement, for in them we have a praiseworthy effort to expound the character and meaning of the chemical exhibit at Wembley in a more popular way. The success attained in this effort varies, of course, from writer to writer; on the whole it is, perhaps, as great as could reasonably be expected. This may seem a stinted measure of praise, but truly, as every experienced teacher knows, it is precisely this kind of elementary presentation of a subject that makes the greatest tax on the faculty of exposition, and instances of the successful popularisation of science in a serious sense are still exceedingly rare.

The writers of these pamphlets appear to have been fully aware that they must assume no preliminary knowledge of science on the part of their readers, and they have endeavoured to give a light touch and to introduce an element of historic and literary allusion. We feel sure that they have done a good turn of service, and that their work will prove of real value in bringing home to a great number of people a keener appreciation of the vast and vital extent to which chemistry is bound up with our national well-being.

The pamphlets are produced in very handy form, and ought to have a ready sale at Wembley in the section on which they form excellent commentaries.

The Time Factor in the Sulphuric Acid Process

AN industrial chemist who called on us some few days ago referred incidentally to the immense importance of the time factor in sulphuric acid manufacture and discussed the merits and demerits of the modern systems which have reduced the time of reaction to a figure which is almost incredible. Quite naturally, those who have spent a number of years in humouring their old chamber systems and who fully appreciate the difficulties of speeding-up reaction are a little sceptical of the practical potentialities of methods which have the appearance of being something more than revolutionary. Until actual working data of the new processes are available it is not possible to pass anything in the way of final judgment upon them. Our visitor was primarily anxious to obtain particulars of the construction of and principles involved in two systems of which lately a good deal has been heard, but of which but little has been made public in the technical literature of this country. The systems in question are the Schmiedel Roller Box and the Metro Bubbler Tank. In addition to those actually connected with the manufacture of sulphuric acid, there are many chemical engineers who are eager to pick up information relating to these methods, but, so far as the Metro system is concerned, we can do no more than refer our readers to the brief reference to the process which was made by Mr. Parrish in a lecture he delivered in March last, a report of which appeared in THE CHEMICAL AGE for March 29. We might mention, however, that the complete patent specification of this apparatus is now published, the number of the patent being 156,328.

So far as the Schmiedel process is concerned, it is claimed that the time contact involved is reduced to the phenomenally low figure of about two minutes, the exceptional rapidity of reaction being attained by

intimate and positive contact of the burner gases with nitrous vitriol. The Schmiedel apparatus consists of a series of splash-boxes, four or more in number, which are made from lead and provided with three undulated rollers which are allowed to dip lightly into the acid. The rollers are caused to rotate so that they produce an atomised " barrage " of acid through which the sulphur dioxide gases must travel in order to pass from the box. The first box in the series acts as a denitrator for the acid, bringing about partial conversion of the gases in much the same way as occurs in a Glover tower. In the following boxes the gases are brought in contact with nitrous vitriol, where rapid conversion is effected of the remainder of the sulphur dioxide, while the acid passing out by way of overflows attached to the boxes is firstly cooled and then put back into circulation. After the final box a spray catcher is fitted : this is followed by absorption towers of fairly considerable cross-sectional area, the latter effecting the recovery of the nitrogen oxides and taking the place of the more common Gay-Lussac tower.

It was, we believe, Mr. Parrish who pointed out that in systems of the kind one of the principal underlying considerations is the extent of the horse-power absorbed per unit weight of acid produced ; but it is scarcely to be thought that the respective inventors can have failed fully to consider the incidence of the power cost on the commercial efficacy of the processes, or that they can have neglected to compare this factor with the same factor as it is met with in such plants as the OPL tower system. The first of the Schmiedel box systems was, we believe, erected at Ausserfelden (in Austria) nearly three years ago in connection with a sulphuric acid plant having a maximum capacity of about 10 tons of 80 per cent. acid per day, and we understand that during this period it has continued to give every satisfaction.

The Chemical Trade Position

SUMMING up the returns of the overseas trade in chemicals during May, details of which are published elsewhere in this issue, it may be said that they are not unsatisfactory on the whole. The total trade of the country in all commodities showed an increase in imports and a slight decrease in exports compared with last year, the drop in exports being more than offset by a fall of £3,000,000 in the value of coal exported. After the rather poor figures for April, the trade under the official heading of chemicals, dyes, drugs and colours, shows a marked increase in imports from £1,158,000 to £1,472,000, and an increase in exports of over half-a-million pounds from £1,865,000 to £2,422,000. Compared with May of last year, there is a drop of £150,000 only in chemical exports, quite a small proportion of the total, while imports again have a healthy tendency and are up £359,000. This increase in imports has been well distributed in the main, but bleaching materials are particularly noticeable in having been imported in nearly twelve times as great a quantity as a year ago. The most marked decrease is in coal tar intermediates, but trade in these is always of a fluctuating nature. On the export side soda compounds are satisfactory, but the greatest interest attaches to the figures for sulphate of ammonia and synthetic dyes. Both these commodities have shown very good increases over the previous year for some time. It is obvious that this could hardly have continued indefinitely at the same rate, and it is satisfactory to note that last year's figures are being maintained.

It is, of course, always a little doubtful to what extent overseas trade is a guide to the state of the chemical industry, but there seems no doubt that the present position in the industry is very fair and markedly better than a couple of years ago. One or two practical instances of this have been brought to our notice recently. Thus, we hear of more than one firm having converted a trading loss into a profit, and in some cases a satisfactory dividend. Again, a large chemical manufacturing firm is pushing ahead with a large works development which is now urgently required, but has been kept in abeyance for some three years, owing to the trade slump. Official employment figures also show that since the year opened there has been quite a marked decrease in unemployment in the chemical and allied trades. Taking all these facts into consideration it would seem that though the trade revival has not quite realised expectations, the outlook is distinctly more hopeful.

Power Plant Chemistry

IN his paper on " Power Plant Chemistry " at Chester on Tuesday, Mr. W. M. Miles had no difficulty in showing the large field for chemical supervision and research presented by power plant, and in indicating particular lines of chemical service that a chemical staff might follow up. These included boiler feed water, coal grading and testing, such difficulties as scale, priming and corrosion, fireclays and refractory materials, insulating and lubricating oils, etc. The qualifications laid down for a competent power plant chemist are pretty comprehensive, and should command a corresponding financial return, especially where, as Mr. Miles estimates, the benefits to the concern should be substantial. The responsible chemist, it was suggested wisely, should not confine himself to his laboratory, but should make himself familiar with the plant as a whole, and welcome any opportunities of exchanging views with the general staff. With regard to methods of training, Mr. Miles favours the plan of starting in the works at the bottom, with suitable scientific and technical education, in preference to selecting men straight from college. The advantage of " going through the mill " is that the man is constantly at work among actual working conditions, and learns to appreciate the requirements not merely as a matter of theory, but from hard facts. Lord Leverhulme said something very similar to this the other day in reference to the direct passage of men from the university to industry.

Progress in Chemical Processes.

FROM one side, perhaps the most interesting point in the annual meeting of W. J. Bush and Co. is the chairman's acknowledgment of the important improvement in processes which their chemists have introduced. The details, of course, are not disclosed, but the improvements are sufficiently important to justify the chairman in stating that, although the company cannot rely much on external aids such as imperial

preference, they have considerable confidence in their ability to meet foreign competition in a number of products. As regards the fine chemical section of the business, which has been developed considerably during and since the war, the company view with concern the possibility of the repeal of the Safeguarding of Industries Act. It is felt, indeed, that, in the event of its repeal, together with the low rates of wages paid on the Continent and the depreciated currencies of various competing countries, the company might be forced to discontinue the manufacture of some of their products. This, of course, would involve the scrapping of a certain amount of valuable plant and the dismissal of a proportion of workpeople. The legislation passed by the consent of all parties to protect the new dyestuffs and fine chemical industries stands in quite a different category from the McKenna duties and ordinary protective enactments. They were passed in the national interest mainly to achieve particular objects, and it seems only just to those who embarked on the enterprise that they should be guaranteed an opportunity of adequate duration for making good.

James Dewar, 1842-1923

THOSE who were privileged to hear Professor H. E. Armstrong's Friday evening lecture at the Royal Institution on the character and work of Dewar and the much larger community who only heard about it will welcome the lecture in the agreeable pamphlet form as published by Ernest Benn, Ltd. (pp. 32, 1s. 6d.). Not the least interesting feature of the volume is that it is a typical example of Professor Armstrong's own style—a style highly individualist, which few other men would attempt to imitate, or, if they did, would succeed in imitating, but which, under his own sure and delicate handling, is a thing always to wonder at and sometimes to envy. In reading the lecture one gets a real grip of the facts of Dewar's life and achievements, but far beyond this one sees the man himself, the qualities of his personality, shown up in all sorts of oblique lights and at surprising angles. It is a piece of fascinating literary portraiture, in which one sees the sitter just as the painter saw him, and the qualities of the painter himself are subtly fused with the qualities of his subject. Professor Armstrong does these things in a way of his own, but it is a very distinctive and illuminating way, and here he is at his best. His admiration and affection for Dewar have a mellowing effect on his treatment, and although it is a critical estimate—as any Armstrong estimate of men or things is bound to be—it is mainly in the nature of appreciation and tribute. The lecture was well worth publishing, and many will be glad to place it among the select few which give an intimate personal atmosphere to a bookshelf.

Membership of the A.C.S.

THE American Chemical Society has decided for the present not to adopt any new classification of membership, though the subject may still come up for consideration at the September meetings. There was a suggestion at one time, we believe, to constitute a Fellowship or some such distinction for members with special positions or special services, but the democratic spirit of the country seems opposed to classification of this order. There appears to be a widespread impression, however, that the qualifications for membership are rather loosely defined, and though the committee which has been inquiring into the matter hold the impression to be unfounded, they suggest a few amendments of rules to tighten up the process of admission. They propose that, in addition to members, life members, honorary members and corporation members, there should be a new section of "student or junior members." Further, in substitution for the rule "Any person interested in the promotion of chemistry may be nominated for election as a member," they suggest the following: "(*a*) Any person interested in chemistry having a baccalaureate degree (which, in the English tongue, means the bachelor degree in arts) or having had the equivalent in training or experience may be nominated for election as a member. (*b*) Any person interested in chemistry and of good character and repute may be nominated for student or junior membership and, if elected, shall, on attaining the requirements for full membership, be so recorded." These rules might have excluded some who are at present members, but there is always an advantage in elasticity, and the real protection lies not so much in rules as in the right use of the electing body's discretionary powers.

Points from Our News Pages

Mr. P. Parrish, in reviewing the second and third volumes in the Lunge-Cumming Series, discusses a number of practical points affecting the manufacture and concentration of sulphuric acid (p. 640).

Extracts are published from the current Board of Trade returns showing the imports and exports of chemical products (p. 642).

Mr. W. M. Miles, of the Sheffield Corporation Electricity Department, in discussing "Power Plant Chemistry" indicates several directions in which a chemical staff would be of practical service (p. 643).

Sir Ernest Benn, in his series of articles, deals this week with "The Middleman in Trade" (p. 644).

Our weekly notes on chemical features at the British Empire Exhibition contain several items of interest (p. 645).

A new instrument, the Rotameter, for recording the rate of flow of liquids or gases in pipes is described by Mr. F. C. Sutton (p. 646).

A description of the Fescol electro-deposition process explains the main features of this cold deposition method of repairing or replacing worn parts (p. 647).

At the annual meeting of W. J. Bush and Co. reference was made to various improvements effected in the firm's chemical processes (p. 648).

The Institute of Chemistry, in view of the opinions of the local sections, has decided to take no action on the proposal to adopt an academic dress for Fellows and Associates (p. 650).

Business in chemicals continues active in the London market. Export trade is better, but a significant decline is noted in the demand from America (p. 655). The Scottish market continues quiet (p. 658.)

The Calendar

June		
21	Institute of Mining and Mechanical Engineers: General Meeting. 2 p.m.	Newcastle-upon-Tyne
23–27	Twenty-Seventh Chemists' Exhibition.	Central Hall, Westminster, London.
24	National Physical Laboratory: Annual Visit of Inspection. 3.6 p.m.	Teddington.
26	Royal Society: Papers by J. W. Nicholson, R. W. Lunt (Communicated by Professor F. G. Donnan), D. W. Dye, and others. 4.30 p.m.	Burlington House, Piccadilly, London, W.1.

"The Manufacture and Concentration of Sulphuric Acid"*

By P. Parrish, A.I.C., M.I.Chem.E.

THESE two important processes constitute the subject matter of Vols. II and III of the Lunge-Cumming series, which have just been published.

Vol. II, relating to the chamber process, has been written by Wilfrid Wyld, and the author of Vol. III is J. W. Parkes, M.Sc., A.I.C.

The two volumes afford evidence of the wisdom of sectionalising the subjects, as the re-arrangement has rendered it possible for much new matter to be introduced. Apart from a detailed treatment of the two subjects, in one volume a discussion of the modern developments in the chamber process is given, and in the other the historical development of acid concentration is traced, and the theoretical principles underlying the various processes are treated in greater detail than has hitherto been possible.

At one period towards the close of the European war the supersession of the chamber process was vaguely foreshadowed, but to-day, owing to economic considerations, it would appear that for the production of sulphuric acid up to 80 per cent. strength it is more firmly established than ever. The oleum process begins to assume importance when strengths over 80 per cent. are required. This is an aspect not without significance, comment on which will be made when dealing later with the question of sulphuric acid concentration.

It will be generally appreciated that the chamber process embraces, apart from the combustion of sulphur material (which was dealt with in Vol. I), the Glover tower, sulphuric acid chambers, and Gay-Lussac towers, together with the necessary draught-producing apparatus. This combination of plant in turn involves the circulation of acid, which has to be pumped or blown by compressed air, the distribution of acid for the irrigation of the towers, the supply of steam or atomised water and oxides of nitrogen to the chambers, and the recovery of the latter at the end of the system. Moreover, the theory of the production of sulphuric acid in the chamber system must necessarily be discussed, as indeed must the methods of control and operation of the plant. In addition, the purification of the acid produced, and the construction of the various sections of the plant, chambers, Glover and Gay-Lussac towers, storage tanks, eggs, pumps, etc., all rightly demand detailed consideration.

Foundations

Generally speaking, the whole gamut, as succinctly outlined above, has been admirably treated, and a due sense of proportion has been observed. Many interesting points arise from a perusal of the several chapters. It is remarked on page 3 that "the pillars upon which the chamber is erected must of course go down to the rock as in any ordinary building of considerable height." In the writer's view, whether the foundations should extend to the ballast or not, depends essentially (*a*) on the nature of the sub-soil; (*b*) on the weight thrown on the foundations; and (*c*) on the provision made, so far as the foundations are concerned, for distribution of the weight. The writer has erected the columns of a sulphuric acid plant on clay, where it has only been necessary to excavate slightly below the damp-line—a matter of 4 ft. in all—to secure satisfactory and stable foundations.

Few sulphuric acid plants in this country exert a greater distributed weight per square foot than 10 cwt. Of course, the distributed weight on the columns constituting the substructure of an acid plant is not uniform throughout. Certain specific columns have to carry a greater weight than 10 cwt.; others (indeed, the larger number) carry less than 10 cwt. These weights are based on an 18 in. depth of acid in the chambers. The depth of acid in the chambers is usually a fluctuating one, and in this respect may be regarded as constituting a live load. It is therefore important that the area of the concrete foundations should be correctly proportioned, in order that the distributed weight on the sub-soil is practically uniform throughout.

An object lesson in the matter of foundations is forced upon those who have been confronted with the levelling of an irregular floor during the renewal of a set of chambers. It is certain that those chemical engineers who have been faced with such difficulty will not overlook the importance of stable foundations.

Construction of Chambers

From the question of foundations we are led to the construction of sulphuric acid chambers, and the methods of supporting the lead. A variety of methods have been proposed from time to time for the support of the lead walls of an acid chamber. What needs to be aimed at is such a construction as will admit of the greatest unrestricted area for the dissipation of the heat. Such provision would be advantageous in two ways. Firstly, from the point of view of the effectiveness of the acid manufacturing process; and, secondly, from the viewpoint of the life of the lead. Lead expands, but the co-efficient of contraction is so slight as to be practically negligible. Suitable allowance must therefore be made to cover this characteristic.

The value of the first chapter would have been enhanced had photographs been furnished showing the actual construction of chambers, the use of the "table" for rearing the side sheets, and the method of framework usually employed for fixing the top sheets. Equally, a statement as to the cheapest gas (whether coal gas and oxygen, or self-generated hydrogen and air, or oxygen) for the autogenous soldering of the sheets would have been welcomed.

Some controversial aspects are entered upon, but the discussion is not completed. At all events it is difficult to arrive definitely at the author's view. Some of these aspects may be stated in the form of interrogations:—

(1) Which is to be preferred—steel or wooden framework for the construction of sulphuric acid chambers?

(2) When does the repairing and patching of sulphuric acid chambers become false economy? In other words, when should the chambers be renewed as distinct from being repaired?

(3) How should the chambers be combined so as to form sets?

(4) Does the consumption of nitre influence the chamber space, or the chamber space influence the consumption of nitre?

When Mr. Wyld comes to the question of a reduction of the cubical capacity of chambers there will be general agreement with him when he says that "the *sine quâ non* for lower chamber space is ample Gay-Lussac capacity." What precisely is meant by "intensive working" needs to be defined. Then it will be possible to determine whether intensive working pays so far as the chamber system *per se* is concerned. In this connection, divergent views are cited. In the 57th Alkali Report (1920), it is stated that "intensive working has much to be said for it." On the other hand, Nemes's statement is referred to, in which he says "Whether it is really more economical to work at 18 or 9 or 6 cubic ft. per ton of sulphur per 24 hours is a question not finally decided."

About eighteen pages are devoted to a description of plant intended to replace lead chambers, but no very definite views are expressed as to the developments which are likely to be expected. The descriptive information and details are, however, interesting.

Glover and Gay-Lussac Towers

Coming to the question of the construction of Glover and Gay-Lussac towers, although the author deals with various types of filling materials and emphasises the importance of knowing the resistance to the gas flow created by any type of packing, he does not attempt to place the design of either of these towers on a really scientific basis. It is true that he deals with past and existing practice in a commendably lucid way, but beyond this he does not go.

On page 213 there is an obvious error. It is stated that "in the case of Glover towers of square section, the lead lining

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* *The Manufacture of Sulphuric Acid (Chamber Process).* (Lunge and Cumming Series.: Vol. II.). W. Wyld. London: Gurney and Jackson. Pp. xii., 424. 31s. 6d. net.

The Concentration of Sulphuric Acid. (Lunge and Cumming Series.: Vol. III.). John Wilfrid Parkes, M.Sc., A.I.C. London: Gurney and Jackson. Pp. xii., 394. 31s. 6d. net.

is usually made of 36-lb. lead, half-way up, the remaining portion of 14-lb." Obviously, 16-lb. is intended, and not 36-lb. The writer, however, does not recommend the erection of the side sheets of the Glover tower in two stages, on account of the unnecessary labour entailed, involving, as it does, eight lifts, whereas four lifts should suffice.

The application of silica gel for use in the recovery of oxides of nitrogen is referred to, but it is stated that no definite data are available at the moment, although considerable work on this subject has been undertaken in Canada. There is reason to believe that the design and operation of the Glover and Gay-Lussac towers are inter-related. At all events, this is the writer's view, and it is a matter to which increasing attention should be given.

Mr. Wyld is on familiar ground in dealing with the starting of chambers and the general questions surrounding the operation and the control of the chamber process. In a review of this character one can only make passing reference to a few of the hundred and one points of interest which are dealt with. As regards the loss of nitre, it is believed that the presence of sulphate of iron in the Glover tower acid—due to the introduction of dust and its oxidation to ferric sulphate in the Gay-Lussac tower—is one of the causes of the loss of nitrogen oxides which is often overlooked. Whether the removal of arsenic should be effected prior to the Glover tower, or whether this impurity should be eliminated from the sulphuric acid by the usual process of dearsenication, is a question on which there will be a diversity of opinion. In any case, whichever process is adopted, it is certain that the operation costs will be appreciable. Small wonder, therefore, that sulphur-bearing material free from arsenic is sought.

The remaining chapters—V, VI and VII—have been compressed within a few pages. They deal respectively with the arrangement of a sulphric acid works (chamber system), other processes for the manufacture of sulphuric acid, and the applications of sulphuric acid, a chapter affording valuable statistical data.

One or two mistakes appear in the text. On page 183 " cubit feet " should be " cubic feet," and on page 382 " cuprous " should be " cupreous." Some of the new diagrams appear to be below the standard of the original ones.

Apart from these slight defects the volume is a creditable one, and it goes without saying that it will continue to be regarded as the standard work on the subject.

Concentration of Sulphuric Acid

The treatment of this subject, as has already been remarked, has been placed in the hands of Mr. Parkes. The volume is divided into ten chapters, the first two of which deal respectively with an outline of the processes used in concentration, and the properties of ordinary concentrated sulphuric acid. The latter chapter is an admirable one in every way, and contains a wealth of information of a reliable character.

With an efficiently designed chamber process it is possible to concentrate the whole of the acid produced to a strength of 140° Twaddell, without recourse to outside concentration. It is important, therefore, not to overlook the value and utility of the Glover tower in this connection. It is true that, owing to dust-laden gases being sent to the Glover, the suitability of the acid emerging from it is in many cases limited. As extraneous concentration of chamber acid to 140° Twaddell represents a cost of several shillings per ton, the importance of securing burner gases free from dust becomes evident.

In the third chapter, concentration in heated pans and retorts is very suitably treated. No mention is made of the difficulties encountered in the concentration of arsenical chamber acid in lead pans, although this is a subject which has been investigated from time to time. Arsenical chamber acid cannot be concentrated in lead, owing to the formation of a " white pan " and the destruction of the lead. Again, as regards the cascade system, a " white chimney " can only be avoided by ensuring a perfectly tight joint between the fume chamber and the products of combustion flue, or otherwise by draught regulation, which involves the use of a fan. Even the best blue asbestos insets deteriorate in time, and inter-communication of the two flues is rendered possible. In the absence of an adequate suction on the fume chamber the acid gases are bound to find their way into the chimney, as they obviously take the line of least resistance. The coke scrubber offers resistance, and hence by-passing and the production of the phenomenon of the " white chimney." This disability, and all that is involved, might have been emphasised to a greater extent with advantage.

The concentration of sulphuric acid in a current of hot gases constitutes the subject matter of chapter IV, and here, again, plenty of useful information has been amassed. The Trepex, Skoglund, Kessler, Perrin, Duron, Gaillard, Gilchrist and Kalbperry plants are dealt with in turn. Unfortunately, some of the questions which arise for consideration by sulphuric acid manufacturers are not discussed. Not infrequently is the question raised as to which is the best type of concentrator to adopt. If perfectly water-white acid is desired, then one must resort almost inevitably to the cascade system, except one prefers to use a more efficient plant of the Kessler or Gaillard type and oxidise the impurities which cause discoloration by means of potassium permanganate. The use of the latter, of course, involves additional cost. A discussion, however, of the relative merits and demerits of the various systems as applied to the concentration of acid under certain specific conditions would have been welcomed.

This chapter is particularly valuable because the mechanism of, and the heat required for, concentration have been dealt with in a very lucid manner.

Chapters VI and VII deal respectively with the condensation of sulphuric acid vapours and the recovery of sulphuric acid from waste acids. Both chapters are the subject of suitable treatment and much valuable information is afforded.

Chapters VIII, IX and X deal with costs and efficiencies, transport of sulphuric acid, and its applications. Under " Costs and Efficiencies " reference is made to the graphical system of representation instituted by Quinan. It is known that this system has been prolific of good results, in emphasising technical efficiencies and in inducing various works to vie with each other in the matter of costs. One can cull valuable data from this chapter which serves to answer to a large extent the question propounded earlier as regards the best concentration system. For example, the approximate average efficiency of concentrating plants during the war period (1914-1918), is stated as follows :—

Cascade plant	.....	85-90 per cent.
Kessler ,,	.....	91-93 ,,
Gaillard ,,	.....	96-97 ,,

Again, evidence can be found in this chapter that the Gaillard plant is more economical to work in all respects, except fuel consumption, than the Kessler plant, and that by reason of its self-cleaning character it operates with marked advantage with dirty acids, whereas frequent stoppages are necessitated with the Kessler type of plant. It is also suggested that the Gilchrist plant never reached the same standard of efficiency as the Gaillard, and the cost was usually much higher.

One other aspect of importance has not received attention. This refers to the utilisation of oleum in the fortification of sulphuric acid of 80-90 per cent. strength, for the production of any desired strength above 90 per cent. Sooner or later the economics of such a method of operation will inevitably force themselves upon chemical manufacturers.

Finally, it may be said that Vol. III, which is well written and well illustrated, will certainly constitute the standard work on the subject of acid concentration for some years to come, and Mr. Parkes is to be congratulated on maintaining unimpaired the Lunge tradition.

New American Chemical Review

A PUBLICATION known as the *Chemical Review* is to be published in America jointly by the American Chemical Society, who will have editorial control, and the Williams and Wilton Co., a firm of publishers in Baltimore. The *Chemical Review* will be a yearly volume of about 500 pages, issued in four quarterly parts, and will contain articles of 20 or 30 pages in the nature of reviews of information, not necessarily the result of original research. The first volume will contain papers given on the occasion of the dedication of the Stirling chemical laboratories at Yale University. The editor-in-chief is Professor W. A. Noyes, editor of *Scientific Monographs*, and the price has been fixed at $4 per annum.

Chemical Trade Returns for May

Notable Increase in Imports

CHEMICALS, dyes, drugs and colours imported during May, according to the official returns, had a total value of £1,471,686, which represents an increase of £358,834 on last year's figures, and also an increase of £313,934 on the figures for April of this year. Exports have also shown a tendency to increase after the set-back noted last month, the figures being £2,422,314 compared with £1,865,154 in April, an increase of £557,160. Compared with May of last year, however, there is a decrease of £150,399.

Examination of the individual totals given below reveals that the increase in imports is well distributed, while perhaps the most notable feature of the export tables is the fact that sulphate of ammonia, and coal tar products generally, including dyes, no longer show the increases which have been such a marked feature of the past months.

Imports for May

INCREASES		1924	1923
Acetic acid	tons	776	717
Tartaric acid	cwt.	4,418	3,428
Bleaching materials	,,	12,296	1,113
Borax	,,	9,707	5,009
Crude glycerin	,,	5,304	386
Red lead and orange lead	,,	3,396	1,501
Potassium nitrate	,,	12,185	4,860
Other potassium compounds	,,	343,442	204,429
Sodium nitrate	,,	256,662	138,867
Other sodium compounds	,,	32,733	20,367
Cream of tartar	,,	5,553	3,134
Zinc oxide	tons	1,083	627
Alizarine dyestuffs	cwt.	1,440	303
Unspecified coal tar dyestuffs	,,	4,349	5,169
Barytes, including blanc fixe	,,	106,598	68,016
White lead	,,	15,348	11,021
Unspecified painters' colours	,,	81,267	53,949
Essential oils, except turpentine	lb.	506,187	365,544
DECREASES.			
Calcium carbide	cwt.	34,910	41,301
Distilled glycerin	,,	95	267
Nickel oxide	,,	2,225	4,401
Intermediate coal tar products, including aniline oil and salt and phenyl glycine	,,	60	536
Synthetic indigo	,,	—	19
Natural indigo	,,	237	67
Turpentine	,,	25,551	27,332
Mercury	lb.	350,890	561,067

Exports for May

INCREASES.		1924	1923
Sulphuric acid	cwt.	2,243	2,225
Ammonium chloride	,,	446	352
Anthracene	,,	590	510
Naphtha	galls.	38,312	13,722
Unspecified coal tar products	cwt.	47,562	41,196
Distilled glycerin	,,	14,087	7,697
Unspecified potassium compounds	,,	3,306	2,732
Sodium carbonate, etc.	,,	698,984	554,712
Caustic soda	,,	192,396	137,386
Sodium chromate and bichromate	,,	6,142	4,845
Unspecified sodium compounds	,,	72,906	64,808
Coal tar dyestuffs	,,	10,707	10,051
Barytes, including blanc fixe	,,	7,701	2,072
Paints and colours ground in oil or water	,,	34,842	32,920
Paints and enamels, prepared	,,	34,065	26,521
DECREASES.			
Tartaric acid	cwt.	914	1,769
Ammonium sulphate	,,	18,119	21,479
Benzol and toluol	galls.	287,800	301,158
Carbolic acid	cwt.	9,217	21,613
Naphthalene	,,	3,831	21,966
Tar oil, creosote, etc.	galls.	5,163,983	6,248,029
Copper sulphate	tons	5,631	8,441
Crude glycerin	cwt.	2,617	11,478
Potassium chromate and bichromate	,,	3,254	5,163
Potassium nitrate	,,	1,270	1,801
Sodium sulphate, including saltcake	,,	129,786	180,602
Dyestuffs, other than coal tar	,,	5,110	6,548
White lead	,,	15,136	17,049
Unspecified painters' colours	,,	59,082	64,302

Heat Insulation Problems

Points from the International Refrigeration Congress

AN International Congress of Refrigeration, the first since the war, opened on Monday in London, and will continue until June 27.

Among the papers presented was one entitled "The Scientific Study of Heat Insulating Materials," by Sir Richard Glazebrook, K.C.B., F.R.S. (Chairman of the Insulation Sub-Committee of the Food Investigation Board), and Dr. Ezer Griffiths (National Physical Laboratory).

The paper was an extensive one, and dealt in detail with investigations which have been carried out by the Insulation Sub-Committee of the Food Investigation Board. The experiments were conducted at the National Physical Laboratory by Dr. Griffiths and his colleagues, and the results obtained have already been issued in two reports, a third being now in preparation. The present paper covered a wide field, and contained a mass of information, a good deal of which was in the form of tables. Among the matters dealt with it drew attention to the necessity for having convenient and reliable methods for determining the relative efficiencies of various insulating materials (since a considerable fraction of the energy supplied to refrigerating plant goes to counteract the effect of heat leakage through the walls of the cool stores), and reviewed the various types of apparatus in use at the National Physical Laboratory for this purpose.

Another question for investigation was that of new materials and their characteristics, for although the insulating materials in use at the present time, such as cork, etc., are extremely efficient, no one would claim that they were ideal. The ideas cold storage insulation would be an assemblage of minute gal cells totally enclosed in a light framework impervious to moisture.

Silicate Cotton as an Insulator

A paper entitled "Silicate Cotton in Regard to Conductivity, Hygroscopy, Fire Resistance, and Sterilisation against Bacteriological Growths" was presented by Mr. G. A. Nelson, a manufacturer of slagwool or silicate cotton, which dealt with the nature, appearance, method of manufacture and properties of slagwool. The author pointed out in the first place that slagwool was purely mineral in composition, and consisted of infinitely fine mineral fibres interlacing one another in every direction, thus forming innumerable minute air cells. In appearance it resembled loose wool or cotton, and, as a result, had been given various names which conveyed the impression that the material was either wool or cotton which had been chemically treated to render it incombustible. Therefore, in order to avoid misconception, it has been given the name of "Slagbestos," the better to indicate its mineral origin and its incombustibility.

Slagwool, or slagbestos, was a manufactured product and not a natural deposit such as asbestos or mica. The modern practice of manufacture was to select various rocks or slags which, by their chemical composition, would produce slag which, when molten, would produce the longest, finest, strongest and most resilient fibres when blown by high superheated steam pressure. These minerals were charged into a cupola furnace and reduced to a fluid mass by the combustion of coke under strong blast pressure. The fluid mass was brought to a very high temperature and allowed to flow from the furnace, and, as it flowed, was impinged upon by jets of high pressure superheated steam, which blew the fluid mass into a fine spray, myriads of minute molten globules being hurled through the air into a large receiving chamber. A veritable tornado or cyclone existed therein, and the myriads of fine filaments produced were whirled in every conceivable direction, thus interlacing themselves into flakes, having the appearance of snow. In this form they fell to the floor of the receiving chamber, and were subsequently collected.

As to the properties of slagwool, Mr. Nelson said it was incombustible and would act as a barrier to the spread of fire in a building. Tests carried out by the British Fire Prevention Committee to prove this were quoted. The material also possessed the quality of non-conductivity to a very high degree.

Mr. G. H. Twelvetrees (of Messrs. J. and E. Hall, Ltd., Dartford) read a paper dealing with "Refrigeration in the Manufacture of Rubber Products," in which he showed the advantage of a small refrigerator plant over the more usual method of cooling with ice.

Chemistry in Power Plant

Services the Works Chemist May Render

In an interesting paper read at the annual convention of the Incorporated Municipal Electrical Association, at Chester, on Tuesday, Mr. W. M. Miles, of the Sheffield Corporation Electricity Department, discussed the subject of power plant chemistry. He pointed out that much useful data and many suggestions had been put forward at various times, from the engineering point of view, for the efficient operation of steam electric power plant this had undoubtedly been in the right direction, but many problems, although primarily electrical or mechanical, were fundamentally chemical in nature and required other than general engineering knowledge for their solution.

Boiler Feed Water

A few years ago the first indication of any chemical knowledge being required in the power plant was possibly the testing of boiler feed water, before and after softening, and rough tests on lubricating oils. Also, with the varying and decreasing value of coal as received, the introduction of a fuel testing department in stations of moderate size became essential. During the last decade the large number of complex problems presenting themselves to the chemist in steam electric power plant operations had been remarkable; in fact, the time was not far distant when no undertaking of any importance would be complete without a chemist or means of recourse to a testing laboratory. Whether in the engine room, boiler house, mains department, sub-stations or stores, there was work for the chemist, who should find plenty of scope for both routine and research work in one of the newest and most interesting industries. Some large electrical undertakings already included a chemical and testing department, but there were many stations without, either because the plant was too small or the probable returns were insufficient to warrant expenditure in that direction.

The Ideal Power Plant Chemist

The power plant chemist, Mr. Miles suggested, should have a good practical and theoretical knowledge of organic and inorganic chemistry, iron and steel analysis, fuel and refractory materials, the chemistry of oils, fats and waxes, heat and heat engines, electricity and magnetism, together with some knowledge of physical chemistry and mathematics, and a habit of never being too old or important to learn. The chemist responsible should not confine himself solely to the precincts of the laboratory, but should investigate and make himself familiar with the plant as a whole, and, wherever possible, collaborate with the electrical and mechanical staff where an exchange of views would help and simplify any work undertaken. With regard to the best way to train a man for this class of work, probably the American system of starting in the works at the bottom, with suitable scientific education, was to be preferred to taking a man straight from college. The latter often quickly picked up the practical side, but the man going "through the mill" was daily brought into contact with actual working conditions and knew the requirements not solely from theoretical knowledge but from hard facts.

Lines of Chemical Service

The paper then dealt in order and in some detail with the manner in which the work of the chemist was called into play in power plants in relation to coal, water, fireclays and refractory materials, insulating oils, lubricating oils and scientific instruments.

As regards coal, the importance of grading and testing for moisture, sulphur, and ash was emphasised, whilst the much-discussed subject of purchasing coal on a calorific basis was also dealt with. The large quantities of coal used by electrical undertakings was sufficient to command attention in regard to this matter, and no doubt or scepticism as to the possibility of the Coal Owners' Association seeing eye to eye with the users' requirements should be entertained. As an alternative to a B.Th.U basis, suitable grades of coal, in which size, ash, and moisture content were fixed as standards, should at least be possible. In the United States and Germany great attention has been given for some time to the purchase and selection of coals.

The correct and scientific treatment of water throughout the power plant was pregnant with interesting and important problems which to the chemist provided a large field for survey and research. Primarily, the treatment of feed water was to eliminate the following troubles: (1) Scale and other matter deposited in boiler drums, tubes and piping; (2) priming; and (3) various forms of corrosion. Experience with various forms of apparatus on the market proved that scale could be more or less eliminated. As regards priming, concentrations of sodium carbonate and hydrate had been considered the chief causes, but opinions of late had differed somewhat and many engineers claimed that even in the presence of high concentrations of dissolved salts priming would not occur provided such insoluble impurities as mud, soap wastes, and matter in suspension were absent. As regards corrosion, there was probably no one cause, but there did appear to be one link in the chain of causes which was apparently essential in nearly every case—viz., dissolved oxygen. Research had shown that, with practically all natural waters, corrosion stopped with the removal of oxygen, but there were so many openings for its admission about a power plant that it presented the most serious drawback to efficient boiler life. Although not nearly so important as feed water, circulating water was an important item, and in many stations the circulating water contained various amounts of corrosive manufacturing waste, acid ganister discharge, etc., all of which called for periodic analysis or daily test. Methods have been tried recently to kill the algæ and organic matter by injecting chlorine into the circulating pump suction and in many cases considerable benefit has resulted, but while chlorine lent itself to the treatment of ordinary algæ, it was not so vigorous in action where the glutinous or organic film was due to the presence of iron bacteria. Before adopting any chlorine treatment, costs and ultimate saving must be carefully analysed to ascertain whether or not it was a commercial proposition. Some less efficient stations might find use for it, but it was quite possible in stations where generation costs were low and present methods were satisfactory that it would not be economical.

Fireclays and Refractory Materials

Coming to fireclays and refractory materials, it was pointed out that the demand for increased boiler ratings and output had necessitated more rigid supervision of steam boiler operations and by decreasing the amount of excess air required had resulted in higher furnace temperatures. Consequently, the question of refractories had become one of the greatest importance. Many firms were already making a superior article, but the development and manufacture of firebricks had not kept pace with the more severe requirements of modern stoker installations. Naturally, refractories in the power plant were constantly subjected to extreme conditions of temperature, but whilst much depended upon correct setting, drying out, and nature of furnace atmosphere, the most suitable firebrick for any particular plant can only be detected and maintained by systematic sampling, testing, and research work. Bricks could not be selected for furnace work on analysis alone. The analysis merely gave the chemical composition without any information as to the physical properties. Therefore the selection of firebricks should not rest wholly upon laboratory tests, but the behaviour under actual conditions should be the chief factor.

In the section dealing with insulating oils, it was pointed out that, although a considerable amount of research work on the properties of transformer and switch insulating oils had been undertaken during recent years, the whole question of oil for electrical purposes was still more or less undeveloped. The choice of a suitable lubricating oil initially rested upon the chemist's investigations, and he was also relied upon to provide information of the deterioration during use, the tests required being the same as those carried out for the ordinary examination of insulating oils. Efficient lubrication on power systems demanded scientific interest and knowledge on the part of the works chemist to ensure the best results being obtained.

In the course of the discussion Mr. W. C. P. Tapper (chief electrical engineer, Stepney) said that a most important point was where the supply of suitable men for the class of work referred to was to come from. Most of the young men coming from the universities and colleges did not have sufficient works experience, whilst the chemistry of the staff of a works, as a rule, was a bit rusty. This required very careful consideration.

The Middleman in Trade—(VII)

Competition Creates Markets—Disparities Between Cost and Selling Price—The Traders' Duty to the Public

By Sir Ernest Benn

THE place of the middleman in the scheme of distribution of goods from manufacturer to consumer is constantly under discussion, and the belief is widely held that he is useless, and that his elimination would be to the general advantage of the community as a whole. Unfortunately, the public has dropped into the habit of thinking of the middleman as one who buys an article for 1s., sells it for 1s. 6d., and robs the consumer of the difference between the two prices. This explanation of trading, whether wholesale or retail, which is freely given to the inquiring elector by the Socialist orator, does not fail to make its appeal, and it has to be confessed that it is often all the information that is given to the public about trading practice and methods. This being so, there is little wonder that many people outside the ranks of Socialism hold the term "middleman" to be one of opprobrium, and few suspect the blessing which the middleman class confers, or the troubles into which the people would fall if that class were really abolished.

The uselessness of the middleman doubtless first came forward as a theory when Karl Marx declared that wealth was composed of land and labour, and that all wealth consists of labour applied to land. It is a matter of surprise that individualists have allowed that destructive theory to get the firm hold that it has upon the mind of the public.

The Essence of the Competitive System

We have reached a stage when it can be claimed that the exchange part of the process of wealth production is of far greater importance than any other factor. It is comparatively easy to make a thing, but generally very difficult to sell it, and unless it is sold or exchanged it is no use making it.

In the interests of the middleman, or rather in the interests of society as a whole, a new attempt should be made to define wealth. If such an attempt were made, I believe we should get a definition something like this: "Wealth is the art of exchange." When riches consisted of gold and silver and precious jewels, flocks and herds and lands, wealth was a very much simpler thing than it is to-day, very much less widely diffused and very much more difficult to get hold of. In those days the middleman did not exist, and the greatly improved position of the masses of the people can be attributed very largely to the creation and development of a vast class of middlemen, who now are held up as parasites and blackmailers.

The middleman is at the very heart of the competitive system; and, incidentally, it may be observed that few words in our language are more loosely used, or so little understood, as the word "competition." A great many people conceive competition to consist wholly of stealing another man's business. There are those who assume that one middleman could supply a whole area, and that if the number of shopkeepers or middlemen in any line of business were reduced costs would be correspondingly lowered and economy would be secured. In most cases, of course, this is far from the truth. This purely superficial view of trading and competition illustrates in a striking manner Professor Marshall's statement (to which reference was made in an earlier article) that the underlying, or secondary, effects of an economic cause are frequently more important than, and in the opposite direction to, those which lie on the surface and attract the eye of the casual observer.

The Most Active Market Maker

Competition creates a market. If you would realise this to the full you have only to go out with some article that has never been seen before—an article with which there is no competition—and try to sell it. You will be received by the public pretty much in the same spirit as the witches were received in the Middle Ages; you will be regarded as a person with a cranky idea and will do very little business. Turn to the goods in which the competitive element enters and you will find that when two competitors in the same line of business are pressing for orders the total of their trade is, as a rule, far more than twice the volume of trade that would be done by either one of them singly; and when some hundreds of people are engaged in advertising, displaying and otherwise offering the same class of goods a demand is created which gives to each of them opportunities that they could not secure by any other means.

Competition, if the dictionary were really accurate, should be defined as market making, and the middleman is the most active market maker the world possesses. When two firms are engaged in the same line of business in the same locality it may appear, at first glance, as if the consumers are paying two expensive organisations to perform work which might equally well be done by one. In practice, however, extra expense in this direction is more than saved to the consumer by the energy and thought and skill which each has to put into the business in order to keep his place and get a livelihood.

It does not follow that reduction of expenses is the road to real economy in trade and business. The aim of a business service should be to give to the public as much as it can, and the almost universal experience is that added expense which gives more than a proportionate additional service or supply is a real economy. When advertising was first beginning to get a hold in this country it was commonly supposed that it would put the commercial travellers out of work, and they, as a class, were opposed to advertising. Later, it was thought that Press advertising was against the printer, as the newspaper announcements would take the place of the circular and catalogue. Successful traders have now learned that the most economical course is to use to the maximum all three forces—advertising, travellers and circulars; they realise that one helps the other, that each does more as the result of the others and that added expenses in any of these directions reduces the ratio of cost to turnover.

It is sometimes argued that the great corporation owning multiple shops makes such a success of its business as to justify the belief that a public organisation controlling and distributing all supplies would be advantageous. The multiple shop system may have had its effect on general trading efficiency, but it has not, as a whole, produced much economy, and the cost of organising the multiple shop service is probably much the same as the cost of running a number of smaller individual businesses.

The Trader as Agent of the Consumer

Having said so much by way of showing that the middleman is a useful, and not a useless, member of society, that he has a very definite place in the scheme of things and that he operates generally for the benefit of the community, it is necessary to say that the middleman is perhaps his own worst enemy in these post-war days. It would be absurd, speaking of the middleman as an individual, to pretend that he was consciously striving all the time to reduce his price and to improve his service, but the absence of conscious right-doing does not affect the argument, for the system under which he works—the presence of many others in the market—generally forces him to do the right thing economically. In recent years, however—thanks firstly to war restrictions, and secondly to abuse of the association idea—middlemen as a body have failed to live up to their responsibilities. The *Spectator* is engaged at the moment in a violent attack upon retail prices and has given some startling instances of disparities between cost and selling price which cannot be justified.

Middlemen are not true to their own interests, or true to their class, unless in their day-by-day practice they decline to take advantage of the opportunities which come their way to secure temporary and unjustifiable profits. The middleman must—and I believe will—get back to full appreciation of the truth, of which he was so constantly aware before the war, that his duty is to act as the agent of the consumers, striving always after economy and efficiency. During the war it was necessary to re-organise trading practice on a basis of scarcity. Now that policy has to be abandoned and prices have to be figured on a basis of an ever-increasing volume of trade. Only in that way will trade begin to improve, employment increase and prosperity develop.

The British Empire Exhibition

Notes and News of Chemical Interest

THE most striking feature of the Wembley Exhibition at the present time compared with a few weeks ago is the immensely greater number of visitors. There are now some 100,000 on ordinary week-days and this number is more than doubled on Saturdays. Though, of course, the serious exhibits do not attract the whole of this number, the avenues in the Palace of Industry are now always well filled. Standholders in the chemical section report that the greatest interest is displayed early in the day, as might be expected, and that the commercial element among the visitors, though not absent, is nevertheless in a very small proportion. The whole value to exhibitors, however, cannot be apparent during the first few weeks.

On Tuesday, Mr. W. J. U. Woolcock conducted a small party of chemical students round the Chemical Section as a preliminary to the visit of 500 students arranged by the Institute of Chemistry in July. Those who made the visit this week will act as guides at the forthcoming visit, and with the assistance of THE CHEMICAL AGE plan they were familiarising themselves with the arrangement and the striking features of the various exhibits.

To Avoid Error

A certain amount of publicity has been given in some quarters to a conference of the "Chemical Association" announced for July 10. As there is no such body as the "Chemical Association" it is perhaps hardly surprising to learn that there will be no conference on that day either. The day was, as a matter of fact, booked provisionally some months ago by the A.B.C.M., but it was long ago decided not to hold any conferences at Wembley. The exhibition authorities, however, could not be persuaded that this was the case and so the announcement has appeared. We are asked to state authoritatively that there will be no conference. In any case the date coincides with the Liverpool meeting of the Society of Chemical Industry.

Changes in Exhibits

No one who has made the frequent visits to Wembley that the Exhibition deserves can fail to notice that various changes are continually being made in the exhibits. This fact alone would make numerous visits confined to a small section

A PICTURESQUE SCENE AT THE BRUNNER, MOND STAND.

interesting, were it not for the fact that the immense size of the exhibition as a whole demands a survey spread over several days.

An interesting display of laboratory apparatus and research chemicals, prepared during the winter and spring terms by the research staff and senior students of the Chemical Department of the University of Birmingham (of which Professor Morgan is the head) has just been added to the collection of scientific exhibits in the Palace of Industry. The laboratory plant includes improved forms of autoclaves, combustion furnaces, geysers and water turbines, and a working model of an electric control for vacuum distillation. Among the more outstanding research specimens are samples of germicidal tellurium compounds, a complete set of complex salts illustrating the chemistry of cobalt, trimethylstibine utilised by Dr. Aston in identifying the isotopes of antimony, basic beryllium acetate, a remarkable crystalline substance studied in conjunction with Sir William Bragg, and recent developments in the chemistry of selenium, molybdenum, and zirconium. The collection includes also silk-dyed patterns and specimens illustrating recent researches on synthetic dyes and intermediates.

MR. WOOLCOCK CONDUCTS A PARTY OF STUDENTS ROUND THE CHEMICAL SECTION.

Interesting and Artistic Pamphlets

To those firms which are issuing specially prepared descriptive pamphlets in connection with the British Empire Exhibition must be added the name of the Castner-Kellner Alkali Co., Ltd. In this case the productions are excellent examples of fine printing and restrained effectiveness. There are three pamphlets in all, containing some eight to twelve pages each, and bound in a thick buff linen-faced paper. The titles are (1) "Chlorine and Chlorine Products in Relation to Public Health; (2) "Bleaching Agents containing Chlorine"; and (3) "Sodium Perborate." The matter deals with the subjects named in such a way that potential users can hardly fail to be interested, and the general public will be able to appreciate the value of some of these heavy chemical products. This is perhaps more particularly true of the booklet dealing with public health, in which the disinfection of water for drinking and for swimming baths with chloride of lime is referred to. Other points are the sterilisation of condenser water with liquid chlorine to remove the gelatinous film which is so likely to form and give trouble, the disinfection of streets, the treatment of sewage, and the disinfection of animals' quarters on farms or in the home. The pamphlet dealing with the bleaching agents in detail gives an outline of the history of chlorine, bleaching powder, and sodium hypochlorite, particulars of the forms in which they are sold, and an outline of their industrial uses.

Sodium perborate is another bleaching agent which is brought to the notice of the readers of the remaining pamphlet. Here is a substance with useful bleaching properties, particularly in dealing with more delicate textiles or in the laundry, as there is an absence of the uncertainty and other disadvantages sometimes associated with chlorine and compounds of hypochlorous acid. It is a valuable *per*salt, and a stable source of hydrogen peroxide. The pamphlet concludes with an outline of the uses and methods of working with perborate.

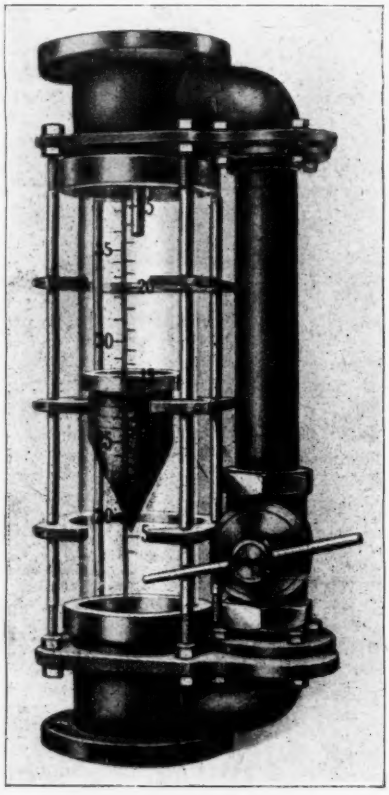
In addition to these pamphlets a leaflet has been prepared in equally good taste dealing with electrolytic caustic soda. Owing to the method of manufacture, this is particularly pure and useful for analytical and research work. An average analysis shows NaOH 99·3 per cent. and Na_2CO_3 0·5 per cent., and it can be supplied in stick form in bottles of 1 lb. and upwards.

Liquids or Gases in Pipes

An Instrument for Recording the Rate of Flow

CHEMICAL industry is ever ready to recognise the merits of any instrument that helps to systematise technological processes. One of the problems with which the works chemist is most often faced is that of accurately controlling the rate of flow of a liquid or a gas. The following article sets out to describe the latest device for this purpose. It will be seen that not only is the instrument exceedingly simple in principle, but also—and this is very important—there are no mechanical devices to get out of order, or moving parts that wear out through friction or similar causes.

The Rotameter consists essentially of a transparent calibrated tube fitted in a vertical position, through which the



flow takes place and within which a special float is held in rotating suspension by the liquid itself.

By a suitable choice of material for the float and end connections these instruments can be made for measuring the rate of flow of any gas or liquid, including acids, alkalis, and corrosive gases such as chlorine, with the single exception naturally of fluorine, against which glass cannot stand up. In the manufacture of sulphate of ammonia, one of the most valuable by-products of the gas industry, the Rotameter has proved of very great utility, and it is the author's firm conviction that before very long no sulphate of ammonia plant, or, for the matter of that, no carburetted water gas plant, will be considered properly equipped until a Rotameter is attached to the liquor pipe to the still, or to the oil pipe leading to the carburettor.

It can be readily appreciated that great economy in ammonia, lime, and steam may be effected by being able accurately to control the rate of flow of ammoniacal liquor into the still.

A very important application of the Rotameter to industry lies in the use that can be made of it for measuring the consumption of compressed air tools. It is recognised by engineers that compressed air under the best conditions is an expensive form of energy, and any saving of waste, by first detecting waste, will be readily welcomed. For autogenous welding plants, where an accurately adjusted mixture of two gases is desired, a twin Rotameter can be used.

In the field of surgery it is recognised that for many operations the ideal anæsthetic is a 20–80 per cent. oxygen and nitrous oxide mixture. Here, again, it is merely a question of installing a twin Rotameter, and watching the relative positions of the floats on the graduated scales.

The reason for the accuracy of the Rotameter lies in the peculiar construction of the float, which is kept in rapid rotation by the stream of gas or liquid flowing past it.

The instrument is entirely frictionless, as the float does not come into contact with the walls of the tube. The rotational movement of the float is much more sensitive to disturbance than the vertical movement, and this fact serves as a safeguard against the imperfect functioning of the instrument. If the float ceases to rotate it gives warning that the instrument needs cleaning. This can be done without uncoupling, and is effected most readily by flushing out the tube with some suitable solvent.

Rotameter readings are dependent upon the density of the gas. For example, a Rotameter that has been calibrated for air if used for gas of, say, 0·445 sp. gr. (air=1·00) will show for a flow of 150 cubic ft. per hour only 100 cubic ft. for the gas of sp. gr. 0·445.

$$\text{for } \frac{V}{V_1} = \sqrt{\frac{M_1}{M}}$$

when V = Velocity of other gas
V_1 = Velocity of air
M_1 = sp. gr. of other gas
M = sp. gr. of air,

$$\text{then } V = V_1\sqrt{\frac{M_1}{M}}$$

$$= 150\sqrt{\frac{\cdot 445}{1}}$$

$$= \cdot 15\ V$$

= 100 cubic ft. per hour.

Rotameter readings for gases are virtually independent of temperature, the error for gases being 0·17 per cent. per 1° C.

Rotameter readings are dependent upon the pressure of the gas in the same way as upon the density, *i.e.*,

$$\frac{V}{V_1} = \sqrt{\frac{P_1}{P}},$$

but the effect of variation of pressure is so small that no pressure correction becomes necessary. In order to overcome practical difficulties Rotameters used for compressed air and compressed gases generally are arranged in such a way that a direct correct reading can be obtained.

The pressure drop caused by the insertion of a Rotameter in a pipe line is normally from 0·2 in. to 2·0 in. water gauge, *i.e.* 0·007 to 0·073 lb. per sq. inch.

Before fitting a Rotameter it is necessary to ascertain

(1) Sp. gr. of liquid or gas.

(2) Minimum and maximum quantities per hour to be measured.

(3) Pressure of gas or liquid in pipe.

(4) Bore (internal diameter) of pipe.

(5) Temperature of gas or liquid and whether they are corrosive or not.

(6) Whether there is any back pressure, or whether the gas or liquid will escape directly into the atmosphere after leaving the Rotameter.

F. COLIN SUTTON.

Synthetic Methyl Alcohol

REPORTS from Germany to the effect that the Badische Company has manufactured methyl alcohol successfully on a commercial scale by a new method are believed in the States to be well-founded, because of the difficulties in making payment for raw material originating outside Germany, which need great concentration on the problems of producing as many raw materials as possible in Germany. As a result of this need it is believed that a practicable plan has been evolved for the manufacture of methyl alcohol from carbon monoxide and hydrogen.

The Fescol Electro-deposition Process

The Salving of Worn Metal Parts

The Fescol process for the electro-deposition of metal to build up worn or spoiled metal parts is fairly well known, and the following article describes both the results obtained and the method used to achieve them.

As the Fescol process consists in the electro-deposition of nickel or other suitable metal on iron or steel, at first sight it seems to bear some resemblance to electro-plating. In the actual method of deposition this resemblance certainly persists, but there is little similarity in the results, which are not to be compared. The deposit in the Fescol process is firmly attached to the base metal, and even in the thinnest deposits of one thousandth of an inch and upwards there is no tendency to flaking or stripping. This property, combined with the exceptional hardness of the deposit, enables it to be used for building up worn bearings, screw threads, etc., with excellent results. The illustration on this page shows examples of a scored shaft, a worn gear wheel and a worn bolt (part sectioned) built up to their original dimensions with a deposit

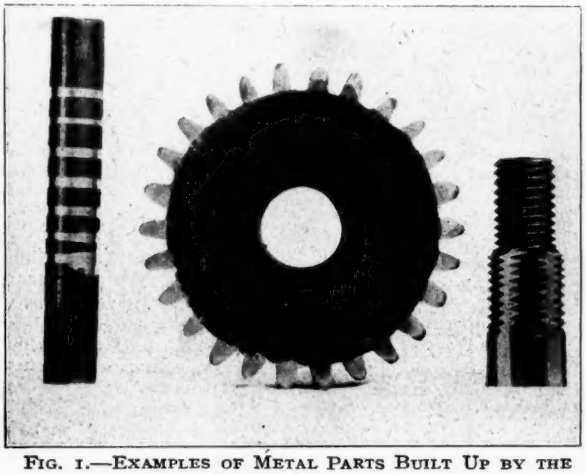


FIG. 1.—EXAMPLES OF METAL PARTS BUILT UP BY THE FESCOL PROCESS

of hard nickel. It will be obvious that as in no part of the process is the article heated above 100° C., this method of adding metal is superior to any welding process, in which the structure of the original metal may be altered by the heating to which it is subjected.

Examples of Work Carried Out

On the occasion of a visit made recently to the Fescol works we noted some remarkable examples of the value of the Fescol process. There were, for example, a number of axle-trees for gun-carriages, one bearing of which in each case had been turned down too small, and was built up with deposited nickel. There were numerous motor parts, such as crank-pins, sent to have the bearing built up, pistons to be increased in size, swivel pins from the steering gear of the London 'buses to be restored to their original size, and, still more remarkable, cylinders of internal combustion engines sent to have the badly worn threads built up in the sparking-plug orifice. This latter is a decidedly strenuous practical test of the adhesive power of the deposit. The wearing qualities of the deposited nickel are frequently better than the original steel, as the following examples indicate :—

(*a*) A steam engine gudgeon pin working 24 hours a day, heavily overloaded and having to be replaced every 14 days, when Fescolised gave no trouble, and at the end of five months was still in use.

(*b*) Omnibus stub axles. New steel showed ·009 in. wear after 4,000 miles, but Fescolised only ·003 in. wear and after 15,000 miles ·008 in. wear.

Tests by the National Physical Laboratory

Some tests carried out at the National Physical Laboratory on steel coated with nickel by the Fescol process show definitely that the deposited metal is actually harder than the base metal. In the case of the Brinell hardness test samples of steel 2 in. by 2 in. by ½ in. were used coated with a nickel coating approximately 0·04 in. in thickness. Three ball impressions were made, using a ball of 5 mm. diameter and a load of 750 kilogrammes. The diameters of the impressions were obtained in two directions at right angles by a measuring microscope, and the hardness numbers calculated from the formula :—

$$H = \frac{W}{A}$$

where H = Hardness number.
W = Load in kilogrammes—750.
A = Spherical area of the impression in sq. mm.

Results.

N.P.L. Eng. Dept. Test Mark.	Mean Diameter of Impression, mm.	Hardness Number.
AFW3A	1·57	377
AFW3B	1·595	366
AFW4A	1·63	349

Small cracks were noticed in the nickel coating round each of the ball impressions. The hardness number of the steel on which the nickel was coated was 298.

In adhesion tests carried out at the National Physical Laboratory the test pieces consisted of steel bolts 1 in. in diameter, with a deposited nickel collar at one end 1 $\frac{5}{32}$ in. in diameter and ·215 in. long screwed to fit the test block. The breaking strain was 11·95 tons, corresponding to 17·6 tons per sq. in. of adhesion surface, and it was found that steel sheared, leaving the nickel still adhering to it (Fig. 2).

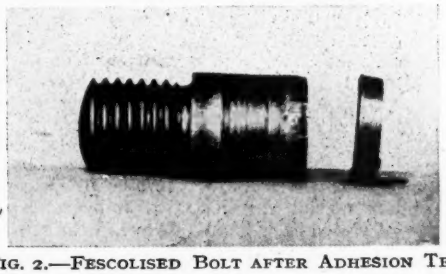


FIG. 2.—FESCOLISED BOLT AFTER ADHESION TEST.

Examination of samples of Fescolised steel under the microscope reveals the reason for the remarkable adhesive properties of the deposit. In the microscopic section illustrated (Fig. 3) it will be observed that the homogeneous deposit of nickel fills up all the minor irregularities in the

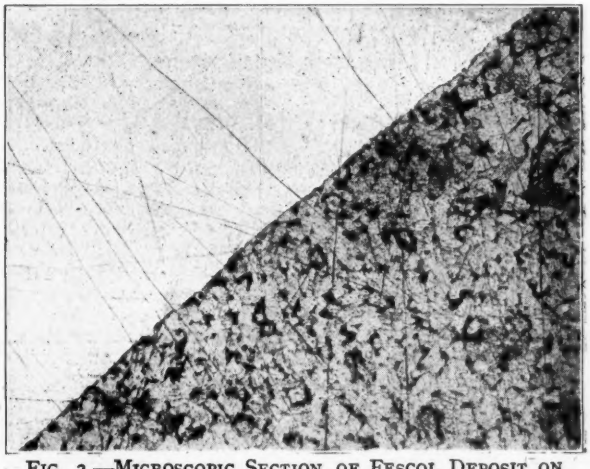


FIG. 3.—MICROSCOPIC SECTION OF FESCOL DEPOSIT ON STEEL. ×250.

surface of the crystalline steel. This is a distinctive feature of Fescol sections, and clearly indicates their adhesive property. Ordinary nickel-plating is never in such close contact and microscopic sections always show a definite black line between the deposited and base metals.

Points in Obtaining the Deposit

Naturally in securing results of such value there are a number of points requiring attention. Though, of course, the process is fully protected, the method of working is not in any sense a closely guarded secret. After a preliminary clean in warm soda solution the parts are dipped into a bath of molten wax. This penetrates into all the interstices of the object, and forms a perfect coating over the whole surface. The wax is then carefully cleaned from the parts where it is desired to deposit metal. Before the wax is applied the part is fixed up with copper-wire so that it may be suspended from the electrodes in the electrolytic vats. Before deposition commences the article is specially cleaned by suspension for a time in an electrolytic acid cleaning bath of special composition, which removes all traces of oxides or other impurities likely to hinder an even deposit. The acid is washed off quickly with water and the object transferred at once to one of the vats, and suspended from the electrodes in a strong solution of nickel ammonium sulphate kept at about 70° F.

The articles remain in the cells from 24 hours to three days according to the depth of deposit required. Current is supplied continuously at 6 volts, and a fairly high amperage, varying with the area of metal under treatment. The current must not be stopped, and for this reason a battery of accumulators forms an essential part of the plant. These are charged from a dynamo during the day, and at night they continue to supply current to the deposition vats. When deposition is complete the article is removed from the cell and the wax washed off in boiling water, this being the highest temperature to which it is subjected at any time during the process. The deposited nickel may then be polished or machined as required, according to the purpose for which the part is used. In the majority of cases nickel is the metal deposited, but copper, chromium, cadmium, lead, iron, cobalt and zinc can be deposited in the same way with similar results. The ability to resist wear and machining is, of course, the most remarkable feature of the Fescol deposit, and for this purpose nickel is the most suitable, both from the results it gives and the question of first cost. It should also be noticed that metals may be deposited by the process not only on ferrous metals and alloys but on aluminium, rendering this metal suitable for purposes which have otherwise been impossible up to the present. It is of interest to those engaged in chemical engineering problems to note that nickel is a highly non-corrodible metal, and that, owing to the compact nature of the "Fescol" deposit, it forms a highly resistant non-corrosive coating, which is free from the tendency of nickel-plating to scratch or peel and lead to accelerated corrosion from the contact of the nickel with the base metal. In addition to the resistance to atmospheric and other corrosive agents, the good wearing properties of the deposit must be remembered.

Lime from Small Stone

PROFITABLE disposal of limestone too small for making lime in the shaft kiln is one of the most urgent problems in the lime industry, states Mr. W. M. Myers, assistant mineral technologist, in Serial 2596, recently issued by the U.S.A. Bureau of Mines. Reports received from 31 quarries show that the proportion of small stone varies from 3 to 40 per cent., averaging 18 per cent. of gross production. Modern methods of heavy blasting and the use of crushers in large quarries tend to increase the proportion of small stone above that produced in early days when light blasting and hand sledging were almost universally used. There is also a growing movement toward underground operation of lime deposits, a method which in general produces a greater proportion of fines than is encountered in open-pit work. Thus the small stone problem is of growing importance, and demands the attention of every progressive lime producer. The general problem of the production of lime from small stone is considered by Mr. Myers in Serial 2596, copies of which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C.

W. J. Bush & Co.'s Successful Year

Improvement in Chemical Processes

AT the annual general meeti[illegible] and Co., London, on Monday, the Chairman (Mr. J. Mortimer Bush), in reviewing the work of the year, said that business conditions had been similar to those in 1922. Their turnover was practically the same, and the moderate increase in the net profit was due to the reversion to their pre-war rate of depreciation on plant and machinery. During the war period the rate was increased to meet the abnormal depreciation which occurred through working at full pressure night and day and under conditions which did not permit of doing repairs at an early stage. These conditions no longer existed and their plant and machinery to-day were in better order than for many years past. The maintenance of their profit was due in a large measure to the improved efficiency of the processes in their fine chemical department and the working economies in their various factories. The fine chemical department was greatly extended during the war period, and had since been fostered under the protection afforded by the Safeguarding of Industries Act. This Act would expire in September, 1926, when, unless extended for a further period, they would be exposed to world-wide competition. In view of the low rate of wages now being paid on the Continent, and the depreciated currencies existing in competing countries, this would be a serious matter, and they might even be forced to discontinue the manufacture of some of their products. In that event, not only would the costly plant which had been erected with so much skill be scrapped, but a number of men would be thrown out of employment.

The company were among those who valued highly the tariff preferences given to British products by the Dominions. In some cases their assistance had enabled them to continue manufacturing. They could not, however, rely upon such exterior aids, and during the past year very gratifying improvements had been achieved by their chemists in several of their processes. He had, therefore, considerable confidence that they would be able to meet foreign competition in a number of products. The benefit of these improvements would be greater during the current year nd in the near future. During the year a further reduction of £8,000 was effected in their bank loan. Their subsidiary companies, both in America and in Canada, made substantial profits and were in a sound financial condition.

On the motion of the Chairman, seconded by Mr. Frederick Bush, a final dividend was declared of 7 per cent. on the ordinary shares, making a total of 10 per cent. for the year.

On the motion of Dr. A. W. Bush, seconded by Dr. Isherwood, Sir G. H. Chubb was re-elected a director.

In acknowledging a vote of thanks to the directors and the staff, the Chairman remarked that they were all as happy a family as it was possible to be, notwithstanding these disturbed and discontented times.

Chemical Matters in Parliament

British Phosphate Commission

In replying to a question by Sir William Mitchell-Thomson (House of Commons, June 17), Mr. Snowden, Chancellor of the Exchequer, said that the accounts and balance sheet of the British Phosphate Commission will be included in the annual volume of trading accounts of Government Departments. He also said that he had been informed that the trading accounts (1922–23 volume) were expected to be published by June 30, and that they would include three years' accounts of the Phosphate Commission.

Zinc Concentrates

Mr. A. N. Alexander, Parliamentary Secretary to the Board of Trade (House of Commons, June 16) in a reply to Sir Frederick Wise, said that 1,298,489 tons of zinc concentrates (including slime concentrates) had been delivered to the British Government under the contract with the Zinc Producers' Association Proprietary, Ltd. He also stated that the prospects for this year are very much the same as they were last year.

The Chemist in Industry

Work for a Great Transport Company

In a paper read recently by Mr. A. T. Wilford, Chief Chemist to the London General Omnibus Co., at an Efficiency Meeting of the Staff, there were a number of points showing the usefulness of a chemist to a purely non-chemical undertaking. The opening of Mr. Wilford's paper explains that the function of a chemist or even a large staff of chemists in undertakings engaged in the production of dyes, soap, paints, alloys, etc., is fairly evident, but it must often be a cause of wonder as to exactly where such a man comes in in the operation of motor omnibuses. The answer to the riddle is quite easy, however, for although the London General Omnibus Co. sells transport, it buys, on the other hand, large quantities of supplies (petrol, lubricants, paint, coal, and cleaning material such as soap, metal polish, etc.). Besides being concerned with supplies, the chemist finds himself called upon to attempt the solution of definite problems connected with the running of the vehicles. The chemist has also had occasion to give evidence in court as to the nature of certain materials used by the company.

Specialised Knowledge and Reports

Another essential problem which confronts the chemist is that of imparting his specialised knowledge in such a way that it will be of service to those who are unfamiliar with the science of chemistry. Thus, whilst those responsible for the operation of the vehicles may be interested to learn that the petrol is perhaps rather more volatile than usual in any particular week, or conversely, if it is less volatile, that steps are being taken to effect an improvement, it is quite without interest to them to know what particular hydrocarbon is responsible for the change. If, therefore, the chemist had in the course of his investigation obtained any information on this point, he would omit the fact from his report.

Briefly, then, the report submitted must be of an intelligible character, giving the history of the subject in hand, the actual results obtained from the investigations and the conclusions to be drawn therefrom. The chemist does not indicate in detail how he obtained his results nor, as a rule, the precise nature of the substance under consideration—his object is simply that of giving relevant information to those who are asking for it. On the other hand it must be ensured that the report is sufficiently technical to indicate the lines on which the results have been obtained—employing a standard method of report and standard methods of analysis where such exist.

The chemist has to realise that, unlike the majority of mankind, he is judged directly by his words and only indirectly by his actions. He must, of course, be ready at all times to back up his words, if required, by the chemical facts, which in the ordinary way he omits from his written reports.

Laboratory Work and Organisation

The laboratory, which forms the chemical section of the experimental department, is to a large extent a self-contained unit. It carries its own particular stores, has its own particular plant (usually termed apparatus), uses fuel and deals with a certain amount of correspondence. As with other sections, therefore, the chemist has to see that his stocks are kept up to his requirements, that his plant is maintained in good condition and that his fuel is not used wastefully.

During 1923 the laboratory examined 2,425 individual samples, of which 2,164 were of a routine character and included petrol, lubricants, coal and coke, white metals.

The routine samples are a first charge on the work of the laboratory and reports must go through regularly and expeditiously. With a total staff of four, the absence of one member through sickness or leave assumes greater importance than does the absence of an individual as a rule, and it is necessary to arrange for every routine job to be efficiently understudied.

In addition to the routine work mentioned above, the chemist has to be prepared to deal with a varying number of samples of a more or less special nature, comprising paints and paint materials, soaps, washing powders, special lubricants, metal polishes, glue, fire extinguisher charges, etc., received from the purchasing department for examination and comparison with present supplies.

A further amount of work is involved in the examination of new fuels, petrol dopes and the like. Whilst some of these samples are analysed almost before they enter the laboratory by reason of the strong odour of camphor or naphthalene which they possess, others are of complex and obscure composition and require a deal of time and attention. The laboratory also co-operates with the mechanical section of the experimental department in the examination of samples of used oils, exhaust gases, etc., obtained in connection with bench and road tests, or from large scale tests at garages.

Other work dealt with by the laboratory includes preparation of disinfectant solution, testing of fire extinguishers, compiling of specifications and recovery of platinum from scrap platinum screws. With regard to this last item it may be of interest to add that during the two years the work has been in progress, nearly 30 oz. of platinum has been recovered and sold, realising a total sum of well over £600. This is only one example of the many ways in which the laboratory is able to effect a saving to the company.

Finally, there is the attacking of various problems submitted from time to time, such as prevention of freezing of radiators, corrosion of fire extinguishers, recovery of used engine oil, and so on.

Keeping Up-to-date

Closely allied to the organisation of the laboratory and its work, is the problem of keeping abreast with the rapid advances of knowledge made in chemistry and science in general, and it is a matter which the chemist cannot afford to neglect. This information is circulated by the technical journals of the various learned societies, the patents list, papers of the U.S. Bureau of Mines, trade journals, etc. The chemist must arrange regularly to peruse such of these sources of information as may bear on his particular branch and must follow up any discovery which is likely to be of importance to him in his work. The value of this to the company lies in the fact that on more than one occasion a fair knowledge has been acquired of a product (fuel or fuel dope, for example) before it has been actually submitted. Changes in standard methods of analysis and more accurate and speedy methods of working are also picked up through this means, and, where desirable, existing laboratory methods are modified accordingly.

In no concern, whether it be a purely chemical one, or, like the L.G.O.C., essentially an engineering undertaking, can the chemist stand alone. He must do his work in conjunction and co-operation with the engineer, and must appreciate the value of the practical test as well as the laboratory test. The supreme test of a material must always be its satisfaction in use or performance in service. Predictions as to the behaviour of a previously unknown substance from purely chemical considerations should only be made with the greatest caution, or the chemist is likely to become a source of expense to the company rather than a saving. It is, of course, permissible and even desirable to indulge in prophecy if the substance in question can be related to any similar material, the performance of which is fairly well known; but no company has place in its organisation for a false prophet.

Recent Work on Isotopes

Dr. F. W. Aston, in a letter to *Nature*, points out that owing to an exceptionally favourable setting of the apparatus for generating accelerated anode rays, he has now been able to settle some doubtful points and obtain results with several more elements. Anode rays of iron have been obtained strong enough to demonstrate beyond doubt the occurrence of its light isotope 54 previously suspected. The intensity of this line relative to the predominant 56 is estimated roughly as 1 to 20. Experiments with strontium have been repeated under better conditions. The conclusion that it consists almost entirely of atoms of mass number 88 has been confirmed, but a very faint constituent at 86 has been discovered which appears to be present to the extent of about 3 or 4 per cent. Among other matters, Dr. Aston states that experiments with barium employing long exposures, have resulted in the identification of its strongest line as 138 with a most probable mass of 137·8. Search for lighter isotopes suggested by the chemical atomic weight 137·37 is prevented for the time being by the penumbra of the enormously strong line of iodine with which element parts of the present apparatus are saturated. Further attempts to obtain results with zirconium, niobium, and molybdenum have again been completely unsuccessful.

From Week to Week

OWING TO INCREASE of business the Stirling Boiler Co. has removed to more commodious premises at 32-33, Farringdon Street, London, E.C.4

MR. H. E. ALCOCK, the managing director of B. Laporte, Ltd., has been elected to the position of chairman in succession to the late Mr. Bernard Laporte.

MR. G. M. BENNETT, M.A., M.Sc., late Fellow of St. John's College, Cambridge, has been appointed Lecturer in Organic Chemistry at Sheffield University.

AT THE SWEDISH INDUSTRIES FAIR to be held at Gothenburg again this year, on August 4-10, chemicals, scientific instruments and foodstuffs will be included in the exhibits.

IMPORTS AND EXPORTS of chemicals in the United States in April this year were lower than the corresponding month last year, though exports were slightly better than in March.

IT IS STATED that the Badische Anilin-und Soda-Fabrik has acquired the controlling interest in the Deutsche Länder bank. The bank will, of course, continue its dealings with the public.

THE THREE German potash concerns of Wintershall, Deutsche Kaliwerke, and Glueckaufsonderdhausen have decided to close down a portion of their works owing to the present wave of depression.

THE COAL OUTPUT from the mines of Great Britain during the week ended June 7 was 5,120,200 tons, as compared with 5,308,300 tons in the previous week and 5,654,300 tons in the corresponding week last year.

WORKERS IN THE gas industry have put forward a demand for a national wages increase of 12s. per week. This claim is to be considered by the Joint Industrial Council of the industry at its meeting this month.

CHLORINE was used in an attack by armed bandits on a mail train in Illinois on Friday, June 13. Chlorine containers were thrown through the windows of the van to overcome the guards and the thieves used gas masks.

SIR ERNEST RUTHERFORD has been appointed official representative of the University of Cambridge at the centenary celebrations in September of the Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts.

WHILE WORKING at the National Physical Laboratory at Teddington on Wednesday, in connection with the Froude tank, a man engaged as a cleaner fell from the roof and displaced some stonework, which fell on a second man. Both men were injured.

THE DEATH OF Dr. R. Mullineux Walmesley, F.R.S.E., occurred on Sunday as the result of an accident. He was principal of the Northampton Polytechnic Institute, Clerkenwell, London, and was noted for his numerous contributions to electrical science.

THE NUMBER of persons on June 9 recorded on the registers of Employment Exchanges in Great Britain was 1,027,000. This was 24,085 more than on June 2, 1924, but 258,623 less than on December 31, 1923. The total includes 763,800 men, 31,600 boys, 200,700 women, and 30,900 girls.

THE DIRECTORS OF BOOTS' PURE DRUG CO., LTD., are to-day, Saturday, taking the whole of the warehouse and office staffs in London, Manchester, and Nottingham to the British Empire Exhibition. Over 5,000 people are participating in the trip, the largest organised industrial party to visit Wembley this year.

THE LATE Mrs. Florence Holland, who died on Friday, June 13, at Nottingham, was mother-in-law to three professors of organic chemistry, namely, Professor W. H. Perkin, of Oxford, and the British Dyestuffs Corporation, Professor F. S. Kipping, of Nottingham, and Professor Arthur Lapworth, of Manchester.

OWING TO CONTINUED expansion of business, Allen-Liversidge, Ltd., the well-known manufacturers of dissolved acetylene and acetylene welders' equipment, have found it necessary to move into larger and more convenient offices. The address of their head offices will in future be Victoria Station House, Westminster, S.W.1.

OWING TO THE recent increase in import duty in the United States on nitrite of soda, which was regarded in many quarters as referring to nitrate of soda, the United States Tariff Commission thought it desirable to issue a press notice explaining the change in duty. This notice pointed out that sodium nitrite and sodium nitrate were two distinct and separate articles.

THE DISTINCTION OF Commander of the Order of the British Empire recently conferred upon Dr. W. O. D. Prendergast, of Hanley, was in recognition of his researches with lead poisoning as affecting primarily pottery workers. He formed definite theories, suggested better methods of mixing glazes and ventilation, wrote articles and books on the subject, and gave evidence before two Royal Commissions.

A SUB-COMMITTEE, consisting of Mr. Francis H. Carr (convener), Dr. J. J. Fox, representing the Institute of Chemistry, and Mr. Edward Hinks, representing the Society of Public Analysts, with the assistant secretary of the Institute acting as secretary, has formulated the standards for hydrochloric acid, sodium chloride, and zinc, to be submitted to the International Union meeting at Copenhagen.

THE LAST MEETING of the 1923-24 session of the Society of Glass Technology was held on Wednesday at the University of Sheffield, the president, Col. S. C. Halse, in the chair. Two papers were read, one entitled "Some Remarks on the Erection of Modern Pot Furnaces," by Professor W. E. S. Turner, and the other a "Note on an Unusual Type of Recuperative Tank Furnace," by Mr. F. W. Hodkin and Professor Turner. A visit has been arranged to Belgium from July 7 to 9, invitations having been received to visit several works.

BENZENE, the material from which the host of dyestuffs manufactured to-day is primarily derived, was first prepared in the Royal Institution laboratory by Faraday, who announced his discovery to the Royal Society on June 16, 1825. The Managers of the Royal Institution, in association with the Chemical Society, the Society of Chemical Industry, and the Association of British Chemical Manufacturers, have decided to celebrate the event of June 16 next year. The arrangements are in charge of a joint committee of the four bodies.

THE COUNCIL OF THE INSTITUTE OF CHEMISTRY have considered replies received from local sections with regard to the proposal submitted at the Liverpool Conference in October last that members should be authorised to wear a distinctive gown. Of the replies from twelve sections, four were more or less in favour of the proposal, four were opposed to it, one was neutral, while three sections had not arrived at a decision. In the absence of any general wish for the provision of a distinctive gown, the Council do not feel called upon to take any further action in the matter.

THE CANADIAN GOVERNMENT OF MINES has, in view of the increased interest now being taken by British financiers and others in Canadian mining, sent over to London two of its technical officers, who will be available, either at the Canadian Pavilion at Wembley, or at the Office of the High Commissioner for Canada, Kinnaird House, Pall Mall East, London, S.W.1, to furnish authoritative information on Canadian mineral resources and on the utilisation of the mineral products found in Canada. The Geological Branch is represented by Mr. Wyatt Malcolm and the Mines Branch by Dr. Alfred W. G. Wilson. Dr. Wilson is an industrial engineer conversant with metallurgical and chemical manufacturing as practised in Canada, and acted as technical adviser to the Canadian War Trade Board during its operations in 1918 and 1919.

IN AN OFFICIAL REPORT from H.M. Consul-General at Canton on the trade conditions at present in China, it is stated that the stocks of sulphate of ammonia held by importing firms have recently been larger than the market could readily absorb. Attention is being centred upon the use of phosphates, as being less likely to sour the ground. Commercial fertilisers are more and more used in South China for crop production. Several large commercial fertiliser companies, both foreign and Chinese, are co-operating with the Canton Christian College in carrying out fertiliser tests. Several experiments are in progress, and plans are being made to enlarge this work, and the organisation of a fertiliser testing station is being planned. The primary object of this station will be to assist in serving importing and exporting firms and aiding in introducing fertilisers to the farmers of South China.

References to Current Literature

British

ELECTROLYSIS.—The hydrogen overvoltage of metals and their characteristic properties. Part I.—Overvoltage and valency. E. J. Weeks. *Chem. News*, June 6, 1924, pp. 359–360.

ANALYSIS.—The estimation of calcium, magnesium, potassium and phosphoric acid in grain and feeding-stuffs. R. Gilmour. *Chem. News*, June 13, 1924, pp. 373–375.

RUBBER.—Rubber softeners; a review of recent research. H. W. Grieder.
Indiarubber J., June 14, 1924, pp. 11–14.

The influence of glue on the reinforcing effect of light magnesium carbonate in rubber. H. W. Grieder.
Rubber Age, June, 1924, pp. 194–199.

Rubber substitutes. E. B. Warren.
Rubber Age, June, 1924, pp. 200–202.

GLYCERIN.—The manufacture and uses of glycerin. *J.S.C.I.*, June 6, 1924, pp. 586–589.

CARBOHYDRATES.—The mechanism of the oxidation of typical carbohydrates with hydrogen peroxide and hypochlorous acid. J. A. Craik. *J.S.C.I.*, June 6, 1924, pp. 171–177T.

ALCOHOL.—The dehydration of alcohol by means of glycerin. E. Knecht and E. F. Muller. *J.S.C.I.*, June 6, 1924, pp. 177–178T.

The chlorination of alcohol. F. D. Chattaway and O. G. Backeberg. *Chem. Soc. Trans.*, May, 1924, pp. 1097–1100.

STEREO-CHEMISTRY.—Some further remarks on optical rotation dispersion. T. S. Patterson. *J.S.C.I.*, June 13, 1924, pp. 614–616.

EXPLOSIVES.—Explosibility. A. Marshall. *J.S.C.I.*, June 13, 1924, pp. 616–618.

PETROLEUM.—Bauxite as a refining agent for petroleum distillation. A. E. Dunstan, F. B. Thole, and F. G. P. Remfry. *J.S.C.I.*, June 13, 1924, pp. 180–188T.

The technical use of bauxite in connection with petroleum refining. A. M. O'Brien. *J.S.C.I.*, June 13, 1924, pp. 188–189T.

DYEING.—The dyeing properties of some Scottish lichens, and of a few other materials. T. S. Patterson. *J.S.C.I.*, June 13, 1924, pp. 189–190T.

TEXTILES.—The influence of micro-organisms in the weathering of wool and cotton. S. R. Trotman and R. W. Sutton. *J.S.C.I.*, June 13, 1924, pp. 190–192T.

DENSITY.—The correction of the density of liquids for the buoyancy of the air. G. Barr. *Chem. Soc. Trans.*, May, 1924, pp. 1040–1044.

ANTHRACENE DERIVATIVES.—Studies in the anthracene series. Parts VIII and IX. E. de B. Barnett, M. A. Matthews, and J. W. Cook. *Chem. Soc. Trans.*, May, 1924, pp. 1079–1086.

CARBAZOLE DERIVATIVES.—The formation of 3-halogen carbazoles from carbazole-3-diazonium halides. S. H. Tucker. *Chem. Soc. Trans.*, May, 1924, pp. 1144–1147.

NAPHTHALENE DERIVATIVES.—The reduction of nitronaphthalenes. Part II. Reduction of β-nitronaphthalene. W. M. Cumming and G. S. Ferrier. *Chem. Soc. Trans.*, May, 1924, pp. 1108–1111.

United States

PAPER.—Chemical engineering methods in soda pulp production. H. J. Payne. *Chem. Met. Eng.*, May 26, 1924, pp. 817–822.

DEXTRINE.—Developments in dextrine manufacture. W. A. Darrah. *Chem. Met. Eng.*, May 26, 1924, pp. 825–828.

CARBONIZATION.—The use of internal heating for low temperature carbonization. C. H. S. Tupholme. *Chem. Met. Eng.*, June 2, 1924, pp. 861–863.

HEATING AND COOLING.—Heat transfer v. agitation; the use of agitation as a means for increasing rates of heating or cooling. *Chem. Met. Eng.*, June 2, 1924, pp. 872–883.

ORGANIC MERCURY COMPOUNDS.—Factors affecting the stability of mercurials and the mercuration of substituted phenylammonium salts. M. S. Kharasch and L. Chalkley. *J. Amer. Chem. Soc.*, May, 1924, pp. 1211–1223.

IRON.—The direct production of wrought iron. E. Fornander. *Chem. Met. Eng.*, June 2, 1924, pp. 864–868.

BIOCHEMISTRY.—The humin formed by the acid hydrolysis of proteins. VIII. The condensation of indole derivatives with aldehydes. G. O. Burr and R. A. Gortner. *J. Amer. Chem. Soc.*, May, 1924, pp. 1224–1246.

DYES.—Researches on quinazolones. XXXV. Stereoisomeric styryl derivatives of some 4-quinazolone alkyl iodides, and their bearing upon the problem of photosensitizing dyes. M. T. Bogert and H. Clark. *J. Amer. Chem. Soc.*, May, 1924, pp. 1294–1301.

SYNTHESES.—Preparation and hydrolyses of substituted cyanamides: di-N-butylcyanamide and diallyl-cyanamide. E. B. Vliet. *J. Amer. Chem. Soc.*, May, 1924, pp. 1305–1308.

Researches on the thiazoles IV. The synthesis of benzothiazoles from orthonitrochlorbenzene. M. T. Bogert and F. D. Snell. *J. Amer. Chem. Soc.*, May, 1924, pp. 1308–1309.

French

ANALYSIS.—Estimation of tartaric acid. A. Kling and A. Lassieur. *Ann. Chim. Anal.*, April, 1924, pp. 103–104.

Estimation of silica in water. Dienert and F. Wandenbulcke. *Ann. Chim. Anal.*, April, 1924, pp. 105–111.

Determination of very small amounts of injurious substances, particularly sulphurous anhydride, in air polluted by industrial fumes. E. Pozzi-Escot. *Ann. Chim. Anal.*, April, 1924, pp. 111–117.

RESINS.—The different modifications of pure resin in gum-lac. C. Harries and W. Nagel. *Les Matières Grasses*, May 15, 1924, pp. 6777–6778.

PETROLEUM.—Argillaceous earths in the refining of petrol. Study of the phenomena of filtration through argillaceous earths. A. Guiselin. *Les Matières Grasses*, May 15, 1924. pp. 6783–6784.

ADHESIVES.—Glues and adhesives; preservation of gum solutions; gutta percha or Sumatra gum. M. de Kegel. *Rev. Chim. Ind.*, March, 1924, pp. 84–86, April, 1924, pp. 100–102.

CEMENT.—The properties and analysis of cements. J. Dautrebande. *Rev. Chim. Ind.*, March, 1924, pp. 80–84, April, 1924, pp. 103–109.

DYEING.—The dyeing of artificial silk (cellulose acetate). R. Clavel and T. Stanisz. *Rev. gén. des Matières Colorantes*, April, 1924, pp. 94–96.

The relation between the constitution of the azo colours of the naphthalene series and their power of dyeing vegetable fibre directly. N. N. Woroshtzow. *Rev. gén. des Matières Colorantes*, April, 1924, pp. 99–100.

STEREO-CHEMISTRY.—The stereoisomerism of tri-substituted α-glycols and the preparation of two stereo-isomers by inverting the order of introduction of the substituent radicles. M. M. Tiffeneau and J. Lévy. *Compt. Rend.*, May 19, 1924, pp. 1724–1726.

SYNTHESES.—A new synthesis of α-N-butyl pyrrolidine. E. E. Blaise and A. Cornillot. *Compt. Rend.*, May 12, 1924, pp. 1617–1619.

Miscellaneous

REFRACTORIES.—Contribution to the study of the resistance to fire of refractory materials. P. Demasure. *Bull. Fed. Ind. Chim. Belg.*, February, 1924, pp. 182–193.

SOLVENTS.—A contribution to the study of methylal as a solvent. A. Bourgom. *Bull. Soc. Chim. Belg.*, February, 1924, pp. 101–114.

CRYSTALLOGRAPHY.—The crystalline form of Becquerelite and Schoepite; their chemical composition and the polymorphism of uranium hydroxide, $UO_3.2H_2O$. A. Schoep. *Bull. Soc. Chim. Belg.*, February, 1924, pp. 88–95.

DYES.—New syntheses in the group of colouring matters derived from quinone-imide. Constitution of induline 6B. F. Kehrmann. *Helv. Chim. Acta.*, May 2, 1924, pp. 471–473.

The extraction from solution of acid wool dyes of the type of Orange II. and certain substantive cotton dyestuffs. P. Ruggli and A. Fischli. *Helv. Chim. Acta.*, May 2, 1924, pp. 496–507 and 514–517.

Patent Literature

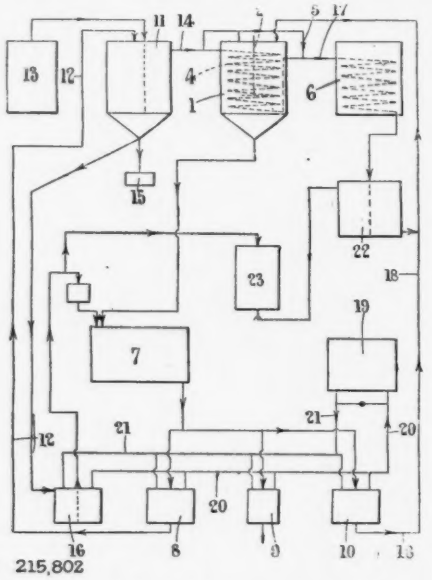
Abstracts of Complete Specifications

215,796. VULCANISATION OF INDIARUBBER. The Dunlop Rubber Co., Ltd., 1, Albany Street, Regent's Park, London, and D. F. Twiss, Fort Dunlop, Erdington, Birmingham. Application date, June 25, 1923.

The object is to obtain a self-vulcanising solution containing indiarubber, principally for repair purposes. The rubber, which may be mixed with zinc oxide, is combined with sulphur and zinc or cadmium normal- or iso-propyl xanthogenate. The sulphur necessary for vulcanisation and the zinc or cadium xanthogenates are kept apart until just before the self-vulcanising solution is employed for use. In an example, the solution consists of rubber 100 lbs., zinc propyl xanthogenate 5 lbs., zinc oxide 50 lbs., and a solvent such as petroleum naphtha, benzene, or carbon bisulphide 60–90 gallons When the solution is to be used, sulphur is added in the proportion of about 8 per cent. of the rubber. The solution becomes vulcanised at ordinary temperatures in about 48 hours, or in a shorter time by heating to a temperature not above 130°C.

215,802. OXIDISED ORES OR OTHER OXIDISED COMPOUNDS OF COPPER AND ZINC, TREATMENT OF. G. W. Edwards and H. T. Durant, 3, East India Avenue, London. Application date, November 20, 1922.

The process is more particularly for treating ores containing copper and zinc in an oxidised condition, by leaching them with an aqueous solution of ammonia and an ammonium salt



215,802

to separate the metals from the gangue. If the oxidised material is in a form which is insoluble, the material must be subjected to any known preliminary treatment to render it soluble. This process occupies a considerably shorter time than that usually employed, and this result is obtained by using an excess of a hot aqueous solution of an ammonium salt containing an excess of free ammonia. The process is also facilitated by mechanically agitating the mixture during the leaching. A complete extraction of the metals can be obtained in about one hour. A convenient leaching solution for oxidised copper ores contains about 6 per cent. by weight of ammonia, and 5 per cent. of carbon dioxide. Such a solution has a dissociation temperature of about 58° C., and it is found that below this temperature an increasing amount of copper passes into solution as the temperature is raised, but above this temperature no further solution takes place and precipitation of the copper already dissolved commences.

In the application to an oxidised copper ore such as malachite, $CuCO_3Cu(OH)_2$, or azurite $2CuCO_3Cu(OH)_2$, the ore is crushed and placed in a leaching tank 1 having a stirrer 2 and a heating coil 4. Any ammonia liberated passes off through a pipe 5 to a condenser 6, the temperature being about 50°C. After about one hour, the charge is run into a filter 7, and the solution passes to a vessel 8. The gangue is washed, and the water is collected in a tank 10. The strong solution is passed through a pipe 12 to a precipitating vessel 11, where it is raised by superheated steam from a boiler 13 to a temperature above the dissociation point of the ammonium salt, preferably about the boiling point of the solution. Most of the ammonia is driven off, and the copper is precipitated as oxide, which is filtered off. The hot vapours pass through a pipe 14 to heat the coil 4. The ammonia distillate collected in the condenser 6 passes to a vessel 22, and thence to the weak solution in the vessel 10 to be used again for leaching purposes. Any vapour from the condenser 6 passes to the scrubber 23, where it is absorbed by the cold boiled-out solution which has been collected in the vessel 16. One or more air pumps 19 are provided for transferring the liquor to the various points in the system. The copper oxide obtained is ready for smelting by any process.

215,810. ALUMINA AND GLASS-MAKING SALTS. R. L. Frink, Grove House, Walton Road, East Molesey, Surrey. Application dates, January 15, 1923, and October 4, 1923.

The process is for making glass-making salts and recovering alumina from a batch containing a silicate, by using gases containing carbon dioxide and monoxide, water and sulphur trioxide, such as are emitted from glass-making furnaces. The materials used are natural silicates, such as kaolin, clay, argillaceous shale or coal refuse, or feldspar, with sodium chloride and lime. The materials are treated with hot glass furnace gases, yielding calcium silicate, sodium aluminate, sodium sulphate, and sodium carbonate. The product is leached to dissolve out the sodium salts, leaving insoluble calcium silicate suitable for the manufacture of glass. The liquor is treated with the waste gases, aluminium hydroxide being precipitated, and the solution of sulphate and carbonate may be concentrated to provide "glass-makers' salt."

215,813. PHOSPHORIC ACID, MANUFACTURE OF. B. Laporte, Ltd., Luton, Beds., and H. E. Alcock, The Knoll, Luton, Beds. Application date, January 18, 1923.

Pure phosphoric acid is usually made from phosphorus pentoxide obtained from phosphorus owing to the difficulty in using mineral phosphates. In this process dibasic sodium phosphate, which is readily obtained pure, is converted into tribasic sodium phosphate and treated with barium sulphide, yielding barium phosphate and sodium sulphide. The barium phosphate is then treated with sulphuric acid, yielding phosphoric acid. In an alternative form of carrying out the invention, barytes is treated with coal to produce a black ash containing 60-75 per cent. of barium sulphide which is lixivated to obtain the barium sulphide. The latter is mixed with caustic soda and dibasic sodium phosphate to produce barium phosphate and sodium sulphide. The sodium sulphide may be recovered, and the barium phosphate treated as above.

215,872. ELECTROLYSING FUSED SALTS OF METALS AND RECOVERING THE METALS AND ACID RADICLES. E. A. Ashcroft, 32A, Liverpool Street, London. Application date, February 27, 1923. Addition to 198,024. (See THE CHEMICAL AGE, Vol. VIII., p. 706.)

The multiple couple electrolysers described in specification 198,024 are modified so that fused salts may be electrolysed to obtain the metal when the latter floats on the electrolyte. The electrodes are arranged horizontally in the form of trays so as to be capable of holding fused alloy, and the lighter metal is deposited into the alloy. The electrodes have passages to allow the upward passage of the liberated metal and the gases and the downward passage of the alloy. The lighter metal is set free from the alloy in another multiple couple electrolyser.

215,929. EMULSIONS, PROCESS FOR THE PREVENTION OF THE FORMATION OF. H. A. Gill, London. From the Sharples Speciality Co., 23rd and Westmoreland Streets, Philadelphia, Pa., U.S.A. Application date, April 16, 1923.

It is known that if oil and water are agitated together, a stable emulsion is produced if an emulsifying colloid is present.

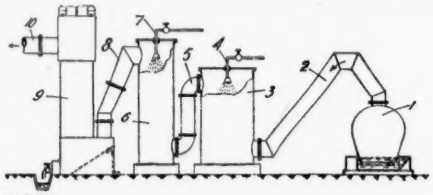
(Continued on page 653)

(*Continued from page* 652)

Those colloids which give emulsions of continuous oil and dispersed water are known as hydrophobes, and those giving continuous water and dispersed oil as hydrophiles. The form of the emulsion thus depends on the predominant emulsifying colloid. As an example, crude petroleum contains a hydrophobe colloid, so that if agitated with water, a water-in-oil emulsion is obtained. If soap, which is a hydrophile colloid, is added in excess, an oil-in-water emulsion may be produced. In this invention, hydrophile colloids and hydrophobe colloids are obtained, soluble or dispersed colloidally in oil and water respectively, such that when added to oil or water respectively, it becomes impossible to obtain stable emulsions of water-in-oil or oil-in-water respectively. In one case, a reagent containing rosin soap, 25 per cent., free rosin, 35 per cent., and water, 40 per cent., may be added in the proportion of 1 per cent. to fuel oil, so that a water-in-oil emulsion cannot be formed on agitation with water. In another case, an aqueous suspension of iron oleate may be added to the water used for washing acid- and alkali-treated oil to prevent its emulsification in the wash-water. Several other examples are given.

216,001. CLEANING GASES, MORE PARTICULARLY PRODUCER GASES. Lodge-Cottrell, Ltd., 51, Great Charles Street and Church Street, Birmingham. (From Metallbank and Metallurgische Ges. Akt.-Ges., 45, Bockenheimer Anlage, Frankfurt-on-Main, Germany.) Application date, July 2, 1923.

Crude gas passes from the main 1 through a branch 2 to a cooler 3 where it comes into contact with cleaned tar from a



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spray 4 and partly dehydrates the latter. The tar is circulated through the cooler till the desired degree of dehydration is reached, and the decrease in its cooling powers is compensated by passing the gas into a cooler 6 where it meets a spray of water 7. The gas finally passes to an electrical precipitator 9. The quantity of water is regulated by a thermostat so as to maintain the required temperature in the electrical precipitator 9.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—195,382 (Dunford and Elliott (Sheffield), Ltd., and A. H. Pehrson) relating to the production of zinc, see Vol. VIII, p. 577; 213,939–40 (Algemeene Norit Maatschappij and J. N. A. Sauer) relating to a process for reactivating decolorising charcoal, see Vol. X, p. 629.

International Specifications not yet Accepted

214,242. ARTIFICIAL RESINS. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, April 10, 1923.

Two molecular parts of a primary or secondary amine, other than *p*-toluidine and N-alkylated anilines, are heated with more than one molecular part of sulphur, with or without a catalyst such as iodine. The product is less soluble in acetone and is harder, with an increase in the proportion of sulphur and continued heating. Examples are given of the use of *o*-toluidine, diphenylamine, and α-naphthylamine.

214,246. DYEING CELLULOSE ACETATE. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, April 14, 1923.

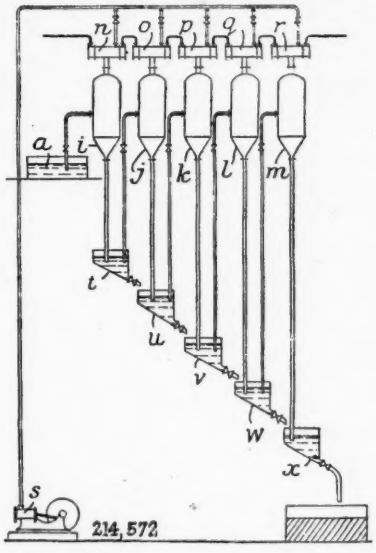
Cellulose acetate silk is dyed in a colloidal solution obtained by dissolving an unsulphonated dye base of the triphenylmethane, anthraquinone or other series in an organic solvent such as glycerine, epichlorhydrin, or ethylene chlorhydrin. Water is added to obtain the base in a finely divided form, and glue, gelatine, Turkey-red oil, etc., may also be added. Examples are given of the use of methyl violet 6B base, China green base, or alizarin geranol base.

214,261. SYNTHETIC DRUGS. G. Lockemann, 126, Konigsweg, Grunewald, Berlin. (Assignee of W. Neumann, 1, Beusselstrasse, Berlin, and H. Kügler, 80, Schlachthofstrasse, Glauchau, Saxony. International Convention date, April 10, 1923.

1-phenyl-2 : 3-dimethyl-4-nitroso-5-pyrazolone is reduced by metals such as zinc or iron in an organic or mineral acid, in the presence of formaldehyde or its polymers, to obtain 1-phenyl-2 : 3-dimethyl-4-dimethylamino-5-pyrazolone. In an example, the nitroso body is treated first with zinc dust, acetic acid, and a copper sulphate catalyst, and then with zinc dust, acetic acid and formaldehyde.

214,572. CRYSTALLISING FROM SOLUTIONS. Appareils et Evaporateurs Kestner, 7, Rue de Toul, Lille, France. International Convention date, April 17, 1923.

Hot solution passes from a tank *a* through a series of evaporating vessels *i* . . . *m*, and is evaporated by reduction of pressure by means of an air pump *s*. The concentrated solutions pass through barometric tubes into reservoirs *t* . . .



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x and then from each reservoir up into the next evaporator. The evolved steam is passed through tubular preheaters *n* . . . *r* through which the dilute solution to be treated is passed.

214,576. PURIFYING GLYCERIN. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.), 35, Lindenstrasse, Berlin. International Convention date, April 18, 1923.

Glycerin is purified by electro-osmosis by passing the current from an anodic diaphragm of linoxyn, prepared by impregnating thin silk or wool fabric with linseed oil or linseed oil varnish containing carbon tetrachloride and drying in warm air. The cathodic diaphragm consists of closely woven sailcloth.

214,578. PURIFYING SACCHARINE. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.), 35, Lindenstrasse, Berlin. International Convention date, April 18, 1923.

Saccharine juices are purified by electro-osmosis by passing the current from an anodic diaphragm of quinone-tanned leather. The leather is prepared by placing cleaned and delimed hides for two to four hours in a rotating vessel containing quinone of 0·4 per cent. strength, washing, and shrinking for one hour in boiling water. Closely woven sailcloth is employed for the cathode diaphragm.

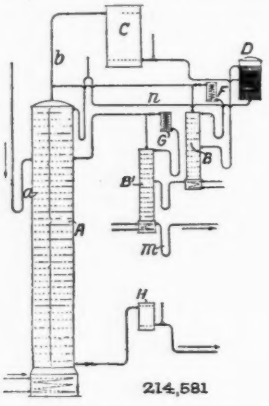
214,579. PURIFYING GLUE OR GELATINE. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.), 35, Lindenstrasse, Berlin. International Convention date, April 18, 1923.

In purifying glue or gelatine by electro-osmosis, an anode diaphragm of wool fabric impregnated with chromated gelatine is used. To prepare the impregnating solution, 30 gms. of gelatine are dissolved in 170 c.c. of water at 50° C. and 3 gms. of potassium bichromate and 30 c.c. of glycerine

then added. The fabric is coated with this solution and exposed to light three times in succession. A cathode diaphragm of parchment is sued.

214,581. Dehydrating Alcohol. Soc. Ricard, Allenet, et Cie., Distilleries des Deux-Sèvres, Melle, Deux-Sèvres, France. International Convention date, April 16, 1923.

Commercial alcohol is mixed with a liquid which forms a constant boiling mixture with the alcohol and water, which distils at a lower temperature than any of the constituents, and separates into two layers on condensation. The added liquid is placed on the plates of a column A and the aqueous alcohol supplied through the pipe *a*, the distillate passing to



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a condenser C and then to a separator D. The upper layer, which is mainly the added liquid, passes to a column B from which its vapour passes to a condenser F. Part of the condensate returns to the column, and part to the condenser C. The lower layer passes from the separator D to the column A. The alcohol and water from the base of the column B is distilled in a column B^1, from which the alcohol passes partly to a condenser G and partly to the column A. If the added liquid layer in the separator D contains much water, the condensate from F is again separated. Dehydrated alcohol is drawn off from the base of the column A.

Latest Notifications.

217,172. Process of manufacture of absolute alcohol. Soc. Ricard, Allenet & Cie. June 7, 1923.

217,183. Purification of gases intended for the manufacture of hydrogen for use in the synthetic production of ammonia. Soc. Chimique de la Grande-Paroisse (Azote & Produits Chimiques).

217,235. Method of dry distillation of alkalised waste liquor from soda cellulose manufacture. Rinman, E. L. June 6, 1923.

217,247. Process for the manufacture of the cardiac glucoside of bulbus scillae. Chemische Fabrik vorm. Sandoz.

Specifications Accepted with Date of Application

194,289. Disinfecting-fertilisers from sulphur or metallic sulphides, Manufacture of. C. Harnist. February 27, 1923.

195,602. Hexamethylenetetramine, Manufacture of. Holzverkohlungs-Industrie Akt.-Ges. March 28, 1922.

196,599. Coal, lignite and bituminous fuel, Process of gasifying. Soc. Anon. de Construction de Fours a Coke Simplex. April 19, 1922.

197,940. Mordant dyestuffs, Manufacture of. Durand and Huguenin Akt.-Ges. May 20, 1922.

199,004. Sulphuric acid, Method and apparatus for automatic regulation of the supply of oxidising agents, nitric acid, nitrate solution, or others in the manufacture of. Aktieselskabet Dansk Svovlsyre- and Super Phosphate-Fabrik, and Dansk Aktieselskab Siemens-Schuckert. June 9, 1922.

208,114. Nitrate of potassium, Processes for making. J. Michael and Co. December 7, 1922.

208,551. Raw cellulose, Process and apparatus for the continuous chlorination of, with a view to eliminating therefrom the non-cellulosic compounds. A. R. de Vains. December 18, 1922.

216,580. Tin from its ores, Process for extracting. E. C. R. Marks. (*American Smelting and Refining Co.*) February 28, 1923.

216,622. Alkylated and aralkylated derivatives of vat dyestuffs, Manufacture of. R. B. Ransford. (*L. Cassella and Co., Ges.*) March 28, 1923.

216,695. Zinc-lead sulphide ores, mattes, and the like, Treatment of. E. A. Ashe. June 2, 1923.

216,708. Gases, Removal of constituents from. G. Schmies and Deutsche Luftfilter-Bauges. June 26, 1923.

216,761. Active carbon, Process for the manufacture of. J. Y. Johnson. (*Badische Anilin und Soda Fabrik.*) September 17, 1923.

216,766. Ferrous alloys. C. Billington. September 29, 1923.

216,789. Electrical precipitation of suspended particles from gaseous fluids, Apparatus for. Lodge-Cottrell, Ltd. (*Metallbank und Metallurgische Ges. Akt.-Ges.*) November 6, 1923.

Applications for Patents

Bolton, C. A. Absorption of sulphur dioxide and hydrogen sulphide. 14,219. June 12.

Carbide and Carbon Chemicals Corporation and Marks, E. C. R. Processes of making alkyl chlorides. 14,077. June 10.

Chemische Fabrik Griesheim-Elektron. Manufacture of mixtures for dyeing or printing textiles. 14,179. June 11. (Germany, June 11, 1923.)

Chemische Fabrik vorm. Sandoz. Manufacture of cardiac glucoside of bulbus scillæ. 14,046. June 10. (Switzerland, June 7, 1923.)

Deutsche Gold-und Silber Scheideanstalt vorm. Roessler, and Liebknecht, O. Manufacture of hydrocyanic acid. 14,458. June 14.

Koppers Co. Elimination of hydrogen sulphide from fuel gases, etc. 14,049. June 10. (United States, June 6.)

Koppers Co. Purification of gases, etc. 14,061. 14,068. 14,082. June 10. (United States, June 6.)

Mehta, V. P. Manufacture of resins. 14,244. June 12. (United States, June 12, 1923.)

Suida, H. Manufacture of concentrated acetic acid. 14,281. June 12. (Austria, June 26, 1923.)

Suida, H. Manufacture of concentrated acetic acid. 14,341. June 13. (Austria, June 26, 1923.)

Thomson, W. T. Nitration of materials. 14,144. June 11.

Tour of Power Stations in U.S.A. and Canada

Mr. R. A. Chattock, City electrical engineer of Birmingham; Mr. G. G. Bell, Borough electrical engineer of Hammersmith; Mr. David Wilson, Mr. G. C. Usher, and several other British engineers, have recently returned from a visit of inspection of super-power stations in U.S.A. and Canada. Detailed information obtained by individual members and their conclusions will be the subject of interesting reports to their respective organisations, but it is stated generally that all the plants visited were complete with the very latest instruments for indicating and recording temperatures, pressures, gas compositions, etc., and several of the more modern plants had, in addition, complete automatic control of the boilers. Members of the party observed that only a faint white mist issued from the chimneys when the boilers were worked at the greatly increased rating which pulverised fuel renders possible. Where power stations are located in residential districts, the public health authorities are satisfied that there is no nuisance, and tests made of deposits taken from various parts of the boilers and flues prove that there is no combustible in the dust and therefore nothing to blacken or damage surrounding property. Mr. G. G. Bell was specially interested in the great strides made in the use of pulverised fuel because he had sufficient faith in the method in 1919 to advise the Hammersmith Council to adopt the system, partly as a means of eliminating the smoke nuisance. Many other interesting propositions were examined on this tour, such as radiant heat superheaters, Murray furnace walls, phase isolation, open air switchgear, and other interesting developments in economical generation and distribution of power. Examples of the use of pulverised coal in industrial operations other than steam raising were examined, and its superiority in giving cheap heat, under close control, was everywhere advocated by users of the system.

U.S. Synthetic Ammonia Development

A scheme is being developed for the construction of a dam across the Columbia River, U.S.A., to provide an electrical power plant of some 400,000 h.p., to be used entirely for metallurgical and electrochemical purposes. Among the processes it is intended to work is the production of ammonia by the Casale process, and of phosphoric acid by the Liljenroth process.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.*

London, June 18, 1924.

BUSINESS still continues inactive and orders are in the main for small quantities only. Considering the paucity of business, the general tone is remarkable. Many firms undoubtedly are holding off purchasing pending stock-taking at the end of the month, but even this does not seem to account for the relatively small turnover.

Export trade is a shade better, but the demand from America is falling off in a significant manner.

General Chemicals

ACETONE is strong on the spot, with very little offering. The material, however, can still be purchased at a lower price for forward delivery, although an improvement is not unlikely in view of the fact that some of the producers in America have shut down. The present value is about £100 per ton.

ACID ACETIC is a shade erratic, and slightly lower prices have been taken in one or two quarters. The value is £47 to £48 per ton for 80% pure and £46 for technical.

ACID CITRIC is extremely firm and meets with a good demand at 1s. 6d. to 1s. 6½d. per lb., less 5% ; the forward outlook is favourable.

ACID FORMIC is in very small request and the price is nominally without change at £60 per ton for 85%.

ACID LACTIC is inactive, and the price fairly easy. For 50% by weight £44 per ton is quoted.

ACID OXALIC is very quiet, but the value at 4½d. per lb. continues in buyers' favour.

ALUM.—A fair amount of business has been transacted and the price is round about £10 10s. per ton.

ARSENIC.—The recent reduction in price has failed to stimulate business to any extent ; the nominal quotation is about £48 per ton.

BARIUM CHLORIDE has not been so active, although the value is well maintained. English manufacture is offered at £14 per ton and Continental at slightly less.

BLEACHING POWDER.—Demand is poor and there is no change in value.

COPPER SULPHATE.—A small inquiry is reported and value continues at round about £23 per ton.

CREAM OF TARTAR.—A slightly better business is reported and for 99/100% material the value is £85 to £86 per ton, less the usual discount.

CALCIUM CHLORIDE.—Unchanged in value at £5 to £5 7s. 6d. per ton ; a fair demand is reported.

EPSOM SALTS.—Business has been slightly better and the price is about £5 per ton for technical quality in bags.

FORMALDEHYDE is again lower and can be obtained at £56 per ton and even lower quotations on forward account.

LEAD ACETATE has been active and spot supplies are rather scarce. It is quoted at £48 per ton for white, and brown is somewhat easy at £43 to £44 per ton.

POTASSIUM CARBONATE.—Only a small business is being transacted and the value is about £26 to £27 10s. for 96/98%.

POTASSIUM PERMANGANATE has been moderately active and can be obtained at round about 8d. per lb. B.P. quality.

POTASSIUM PRUSSIATE.—This article has firmed up slightly owing to some of the cheaper Continental parcels having been absorbed. It is now standing at 8½d. to 9d. per lb., according to quantity and delivery.

SODIUM ACETATE has been in demand on export account and the value is firm at about £24 10s. per ton.

SODIUM BICHROMATE.—A fair business is reported at English makers' figures.

SODIUM HYPOSULPHITE.—Only a moderate business is noted for English material, and Continental make is somewhat pressed for sale.

SODIUM NITRITE.—A slightly improved inquiry is in evidence, and with limited stocks available £28 per ton ex store is easily obtainable.

SODIUM PRUSSIATE.—The slight improvement in demand is maintained, but the price is unchanged at 4½d. per lb.

SALTCAKE.—A small business has been transacted at the export price of £3 per ton f.o.b.

SODIUM SULPHIDE.—Only a small business is reported at unchanged values.

ZINC SULPHATE is still easier and the value is about £13 15s. to £14 per ton.

Coal Tar Intermediates

A small business has been transacted mainly on home trade account, and there are practically no price variations to report. Little forward business is being done.

ALPHA NAPHTHOL.—Unchanged at 2s. 2d. per lb.

ALPHANAPHTHYLAMINE.—Home trade business is steady and unchanged at 1s. 4½d. per lb.

BENZIDINE BASE.—Only in moderate demand and without change in value at 4s. 4d. to 4s. 6d. per lb. on a basis of 100%

BETA NAPHTHOL.—A moderate turnover has been effected and the price is steady at 1s. 1d. per lb.

NITROBENZOL is weak and little interest is taken in the product : it is being quoted at 5d. per lb. at works.

PARAPHENYLENEDIAMINE.—Quietly steady at 10s. 3d. per lb.

PARANITRANILINE.—A small business has been transacted and is quietly steady at 2s. 4d. per lb.

Coal Tar Products

There is little fresh business passing in coal tar products, and prices generally have a downward tendency.

90% BENZOL is steady at 1s. 6d. per gallon on rails.

PURE BENZOL is quiet, and is worth 1s. 10d. per gallon on rails.

CREOSOTE OIL is of little interest and prices continue to fall. Its value is about 6¾d. per gallon on rails in the North for prompt delivery, while the value in London is about 7¾d. per gallon.

CRESYLIC ACID is firm, the pale quality 97/99% being quoted at 2s. 1d. per gallon on rails, while the dark quality 95/97% is quoted at 1s. 9d. per gallon on rails.

SOLVENT NAPHTHA is stationary at 1s. 3d. per gallon on rails.

HEAVY NAHPTHA is worth about 1s. 2d. per gallon on rails.

NAPHTHALENES are quiet, the low qualities being worth from £5 10s. to £6 per ton, 74/76 melting point £6 10s. to £7 per ton, and 76/78 melting point £7 to £7 10s. per ton.

PITCH is dull and prices are unchanged.

Sulphate of Ammonia

There are no new features to report.

Dyestuffs Industry Development

THE Dyestuffs Industry Development Committee appointed by the Board of Trade has issued a list of British colours with their foreign equivalents (H.M. Stationery Office, pp. 28, 1s.). The list contains only standard products of British manufacture which are definitely known to have equivalents of foreign origin. Obviously, therefore, it does not comprise the whole range of dyestuffs manufactured in Great Britain. Where a colour is scheduled in the British *Colour Index* or in the German *Farbstofftabellen* the reference number under which it is scheduled is given. In addition to such reference numbers, and also in cases where there are no reference numbers, one or more names by which the foreign equivalent is commonly known is given.

The British manufacturing firms represented in the list are the Alliance Colour and Chemical Company, Ltd., J. C. Bottomley and Emerson, Ltd., British Alizarine Co., Ltd., British Dyestuffs Corporation, Ltd., Brotherton and Co., Ltd., Clayton Aniline Co., Ltd., Colne Valley Dye and Chemical Co., Ltd., Grays Dyes and Colours, Ltd., Hickson and Partners, Ltd., L. B. Holliday and Co., Ltd., J. W. Leitch and Co., Ltd., Major and Co., Ltd., North British Chemical Co., Ltd., J. C. Oxley's Dyes and Chemicals, Ltd., Scottish Dyes, Ltd., J. B. and W. R. Sharp, Ltd., Southdown Chemical Co., Ltd., Williams Bros. and Co., and the Yorkshire Dyeware and Chemical Co., Ltd.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

All grades of Boric Acid have been reduced by £3 per ton as from June 11. Borax prices remain unchanged. Prices remain generally steady.

Acid Acetic 40% Tech.—£23 10s. per ton.
Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton.
Acid Hydrochloric.—3s. 6d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots.
Bisulphite of Lime.—£7 per ton, packages extra.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chloride.—£5 17s. 6d. per ton d/d.
Methylated Spirit 64 O.P.—Industrial, 3s. 1d. to 3s. 5d. per gall. Mineralised, 4s. 2d. to 4s. 6d. per gall., in each case according to quantity.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5¾d. per lb.
Potassium Chlorate.—3d. to 4d. per lb.
Salammoniac.—£32 per ton d/d.
Salt Cake.—£3 10s. per ton d/d.
Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.
Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton carr. paid.
Sodium Bichromate.—4½d. per lb.
Sodium Bisulphite Powder 60/62%.—£18 to £19 per ton according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—3d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.
Sodium Sulphide Crystals.—£9 per ton d/d.
Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Prices in this section remain unaltered.

Acid Carbolic Crystals.—6½d. to 7d. per lb. Demand quiet. Crude 60's, 1s. 9d. to 1s. 10d. per gall. Market flat, only odd lots being offered.
Acid Cresylic 97/99.—2s. 1d. to 2s. 3d. per gall. Demand still good. Market firm. Pale 95%, 1s. 10d. to 1s. 11d. per gall. Steady demand. Dark, 1s. 8d. to 1s. 11d. per gall. Steady business.
Anthracene Paste 40%.—4d. per unit per cwt. Nominal price No business.
Anthacene Oil, Strained.—9½d. per gall. Very quiet. Unstrained. 8½d. to 9d. per gall.
Benzol.—Crude 65's.—10½d. to 1s. per gall. ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall. ex works in tank wagons. Pure, 1s. 8½d. to 1s. 10d. per gall. ex works in tank wagons.
Toluol.—90%, 1s. 5½d. per gall. Pure, 1s. 10d. to 2s. per gall.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic 20/24%, 9d. to 9½d. per gall. Few inquiries. Middle Oil, Heavy and Standard Specification, 7d. to 9d. per gall. according to grade and district. Demand not so strong.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 4d. to 1s. 5d. per gall. Market steady. Solvent 90/190, 1s. 1d. to 1s. 2d. per gall. Market steady. Fair business passing.
Naphthalene Crude.—Drained Creosote Salts, £6 to £6 10s. Demand falling off. Whizzed or hot pressed, £9 to £12 per ton. More inquiry.
Naphthalene.—Crystals and Flaked, £16 to £17 per ton.
Pitch.—Medium soft, 52s. 6d. to 57s. 6d. per ton. Market steadier. Few inquiries for forward delivery. Very little business for prompt.
Pyridine.—90/160, 21s. 6d. to 22s. per gall. Demand well maintained. Heavy, 12s. to 12s. 6d. More business passing.

Intermediates and Dyes

Business in dyestuffs has been fairly good and seems again to be on the upward move. Prices remain unaltered.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 6d. per lb.
Acid H.—4s. 4d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d.
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—1s. 2d. to 1s. 3d. per lb. Steady demand.
Acid Sulphanilic.—10d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—1s. per lb. d/d.
Aniline Oil.—7¾d. to 8¼d. per lb. naked at works.
Aniline Salts.—7¾d. to 9d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—4s. 6d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 3d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 19/31° C.—4¾d. to 5¼d. per lb. Demand moderate.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—3s. per lb.
Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.
p-Dichlorbenzol.—£75 per ton.
Diethylaniline.—5s. per lb. d/d., packages extra, returnable.
Dimethyaniline.—2s. 4d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.
Diphenylamine.—3s. per lb. d/d.
Monochlorbenzol.—£63 per ton.
B-Naphthol.—1s. 1d. per lb. d/d.
a-Naphthylamine.—1s. 4½d. per lb. d/d.
B-Naphthylamine.—4s. per lb. d/d.
m-Nitraniline.—5s. 3d. per lb. d/d.
p-Nitraniline.—2s. 4d. per lb. d/d.
Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.
Nitronapthalene.—11¾d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. 2d. per lb. d/d.
p-Phenylene Diamine.—10s. 3d. per lb. 100% basis d/d.
R. Salt.—2s. 6d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 5d. per lb. 100% basis d/d.
o-Toluidine.—8½d. per lb.
p-Toluidine.—3s. 6d. per lb. naked at works.
m-Toluylene Diamine.—4s. 6d. per lb. d/d.

Wood Distillation Products

All prices keep fairly stable, but there is room for improvement in business.

Acetate of Lime.—Brown, £14 10s. per ton d/d. Demand active. Grey, £19 to £20 per ton. Fair demand. Liquor, 9d. per gall. 32° Tw.
Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Demand below normal.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 7d. per gall. Unrefined.
Wood Naphtha, Miscible.—5s. per gall. 60% O.P. Market dull. Solvent, 5s. 6d. per gall. 40% O.P. Fairly good demand.
Wood Tar.—£5 per ton.
Brown Sugar of Lead.—£49 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 6d. per lb., according to quality.
Arsenic Sulphide, Yellow.—1s. 11d. per lb.
Barytes.—£3 10s. to £16 15s. per ton, according to quality.
Cadmium Sulphide.—3s. 9d. per lb.
Carbon Bisulphide.—£24 to £26 per ton according to quantity.
Carbon Black.—6½d. to 6¾d. per lb. Market firmer.
Carbon Tetrachloride.—£55 per ton, drums free.
Chromium Oxide, Green.—1s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—4¾d. to 6½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.
Lamp Black.—45s. per cwt., barrels free. Dearer.
Lead Hyposulphite.—7½d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£15 10s. per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—3d. per lb., carboys extra.
Thiocarbanilide.—2s. 9d. per lb.
Vermilion, Pale or Deep.—4s. 10d. per lb. Easier.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

Pharmaceutical and Photographic Chemicals

The demand is steady for small quantities required for home consumption, but export inquiry for larger bulk is wanting.

Acid, Acetic 80% B.P.—£48 per ton.
Acid, Acetyl Salicylic.—3s. 3d. to 3s. 5d. per lb. Market rather weak, but fair demand.
Acid, Benzoic B.P.—3s. 9d. per lb. Larger supplies available.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain. Prices reduced by £3 per ton.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 6½d. per lb., less 5% for ton lots. Market extremely firm. Upward tendency.
Acid, Gallic.—3s. per lb. for pure crystal. Market very steady.
Acid, Pyrogallic, Crystals.—7s. per lb. for 1 cwt. lots. Market firm; increasing demand.
Acid, Salicylic.—Prices quoted from 2s. per lb. down to 1s. 9d. for ton lots. Market weak.
Acid, Tannic B.P.—3s. per lb. Market quiet.
Acid, Tartaric.—1s. 1½d. to 1s. 2d. per lb., less 5%. Better tone, but not yet very active. Cheap offers of second-hand parcels of foreign acid. Higher prices expected in view of firmness of raw materials.
Amidol.—9s. per lb. d/d.
Acetanilide.—2s. 3d. per lb. for quantity. Demand slow. Prices shaded to secure large orders.
Amidopyrin.—13s. 6d. per lb. Neglected. Stocks low.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb. according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—15s. 6d. per lb. Quiet market.
Benzonaphthol.—5s. 6d. per lb. Small inquiry.
Bismuth Salts.—A steady market. Prices according to quantity.
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb.
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb.
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb.
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Fluctuating market. Continental prices decidedly firmer. Potassium, 11d. per lb.; sodium, 1s. per lb.; ammonium, 1s. 1d. per lb.
Calcium Lactate.—Demand active. Good English make can be had from 1s. 7d. to 2s. 6d. per lb.
Chloral Hydrate.—3s. 10d. per lb., duty paid.
Chloroform.—2s. per lb. for cwt. lots. Market more active. Makers busy.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£57 per ton, ex works. English make.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—11s. 3d. per lb. for cwt. lots. Export orders small.
Hexamine.—3s. 6d. per lb. for English make. Market dull.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb. for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity. Advanced by 2d. per lb.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £26 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 55s. per lb. Weaker. Synthetic, 26s. to 35s. per lb., according to quantity. English make. Steady demand.
Mercurials.—Market firm. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—2s. 1d. to 2s. 6d. per lb. for carboys. Not much demand.
Metol.—11s. per lb. British make.
Paraformaldehyde.—3s. per lb.
Paraldehyde.—1s. 4d. to 1s. 6d. per lb. in free bottles and cases. Better demand.
Phenacetin.—6s. per lb. Very slow.
Phenazone.—7s. per lb. for cwt. lots. Quiet.
Phenolphthalein.—6s. 6d. per lb. Weaker.
Potassium Bitartrate 99/100% (Cream of Tartar).—88s. per cwt., less 2½% for ton lots. Firm market. Prices have upward tendency.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Demand continues.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included.
Potassium Permanganate.—B.P. crystals, 8¾d. to 9d. per lb., carriage paid; commercial, 8d. to 8¼d. per lb., carriage paid.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—5s. 6d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb. Very quiet.
Silver Proteinate.—9s. 6d. per lb.
Sodium Benzoate, B.P.—2s. 9d. per lb. In steady demand for good qualities.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity. Firmer in common with other citrates.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—77s. 6d. to 81s. 6d. per cwt., according to quantity. Market quiet.
Sodium Salicylate.—Market easier. Powder, 2s. 3d. to 2s. 6d. per lb. Crystal, 2s. 6d. to 2s. 8d. per lb. Flake, 2s. 9d. to 3s. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity, 1 cwt. kegs included. In large casks £1 per ton less.
Thymol.—15s. to 15s. 6d. per lb. for good white crystal from ajowan seed. Very firm and scarce.

Perfumery Chemicals

Acetophenone.—12s. 6d. per lb.
Aubepine.—14s. 6d. per lb.
Amyl Acetate.—2s. 9d. per lb.
Amyl Butyrate.—6s. 9d. per lb. Cheaper.
Amyl Salicylate.—3s. 3d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—3s. per lb. Cheaper.
Benzyl Alcohol free from Chlorine.—3s. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—15s. 6d. per lb.
Coumarin.—20s. per lb.
Citronellol.—16s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—15s. per lb.
Ethyl Phthalate.—3s. 3d. per lb. Reduced.
Eugenol.—10s. 6d. per lb. Cheaper.
Geraniol (Palmarosa).—35s. per lb.
Geraniol.—11s. to 18s. 6d. per lb.
Heliotropine.—6s. 6d. per lb. Reduced.
Iso Eugenol.—15s. 9d. per lb.
Linalol ex Bois de Rose.—28s. 6d. per lb. Reduced.
Linalyl Acetate.—28s. 6d. per lb. Reduced.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—6s. per lb.
Musk Ambrette.—48s. 6d. per lb. Reduced.
Musk Xylol.—16s. 6d. per lb. Reduced.
Nerolin.—4s. per lb.
Phenyl Ethyl Acetate.—12s. 6d. per lb.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—57s. 6d. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 9d. per lb.
Vanillin.—25s. 3d. to 26s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—3s. per lb.
Bergamot Oil.—19s. 6d. per lb. Dearer.
Bourbon Geranium Oil.—36s. 6d. per lb. Advanced.
Camphor Oil.—75s. per cwt.
Cananga Oil, Java.—10s. 6d. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 3d. per lb.
Citronella Oil.—Java, 85/90%, 6s. per lb. Again dearer. Ceylon, 3s. 9d. per lb.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—2s. 2d. per lb.
Lavender Oil.—French 38/40% Esters, 27s. 6d. per lb.
Lemon Oil.—3s. 2d. per lb.
Lemongrass Oil.—3d. per oz.
Orange Oil, Sweet.—13s. 9d. per lb.
Otto of Rose Oil.—Bulgarian, 27s. 6d. per oz. Anatolian, 23s. 6d. per oz.
Palma Rosa Oil.—19s. per lb.
Peppermint Oil.—Wayne County, 20s. 9d. per lb. Cheaper. Japanese, 15s. 6d. per lb. Cheaper.
Petitgrain Oil.—10s. per lb.
Sandal Wood Oil.—Mysore, 26s. 6d. per lb. Australian, 21s. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, June 18, 1924.

BUSINESS in the heavy chemical market continues very quiet, what little inquiry there is being in nearly all cases for small quantities.

Prices for some home manufactured products show a slight decrease in some cases. Continental offers are on about the same level as last reported.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £60 to £70 per ton; 80% pure, £49 to £50 per ton; 80% technical, £46 to £47 per ton. All packed in casks delivered, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Makers advise reduction in price of £3 per ton. Crystal or granulated now £45 per ton; powder, £47 per ton, carriage paid U.K. station, minimum ton lots.

ACID CARBOLIC ICE CRYSTALS.—Price remains unchanged at about 6¼d. per lb., carriage paid or f.o.b. U.K. port.

ACID CITRIC B.P. CRYSTALS.—Quoted 1s. 6¼d. per lb., less 5 per cent., ex store, spot delivery. Offered for early delivery at 1s. 5¾d. per lb., less 5 per cent. ex wharf.

ACID FORMIC, 85%.—Quoted £62 5s. per ton, ex store, spot delivery. 80% quality on offer at about £57 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Rather better inquiry. Unchanged at about 4¾d. per lb., ex store. Offered from the Continent at about 4¼d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. De-arsenicated quality 20s. per ton more.

ACID TARTARIC B.P. CRYSTALS.—Now quoted 1s. 2d. per lb., less 5% ex store. Offered for forward delivery at about 1s. 1½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE 17/18% IRON FREE.—Quoted £7 15s. per ton, ex store spot delivery. Offered for early delivery at about £7 2s. 6d. per ton, c.i.f. U.K. port.

ALUM CHROME.—Ammonium chrome alum quoted £19 to £21 per ton, according to quality, f.o.b. U.K. port. Potash chrome alum on offer at £26 per ton, ex store.

ALUM POTASH (LUMP).—Moderate inquiry and price unchanged at about £10 10s. per ton, ex store. Offered for early delivery at £9 10s. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Moderate inquiry and price unchanged at about 1s. 5½d. per lb., ex station, spot delivery.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K.

AMMONIA LIQUID 880°.—Unchanged at 2½d. to 3d. per lb., delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanisers quality quoted £30 per ton, ex station. Fine white crystals of Continental manufacture quoted £27 10s. per ton, ex store, spot delivery. Offered for early delivery from the Continent at £25 10s. per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 12s. per ton; 25¾% neutral quality, £14 15s. per ton, ex works, prompt delivery.

ARSENIC WHITE POWDERED.—Moderate inquiry for export. Quoted £48 per ton, f.o.b. U.K. port. Spot lots on offer at about £54 per ton, ex store.

BARIUM CARBONATE 98/100%.—Quoted £11 10s. per ton, c.i.f. U.K. port, prompt shipment from the Continent.

BARIUM CHLORIDE 98/100%.—English material unchanged at about £14 per ton, ex store. Offered from the Continent at about £15 5s. per ton, c.i.f. U.K. port.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Prices remain unchanged. Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. station, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Quoted £5 per ton, c.i.f. U.K. port, prompt shipment from Continent.

COPPERAS GREEN.—Unchanged at about £2 5s. per ton, f.o.b. U.K. port, in bulk. Quoted £3 5s. to £3 10s. per ton, in casks.

COPPER SULPHATE.—On offer at £23 10s. per ton, f.o.b. U.K. port for export.

FORMALDEHYDE 40%.—Spot lots now offered at £57 per ton, ex wharf, quoted £54 per ton, c.i.f. U.K. port, June shipment.

GLAUBER SALTS.—English material quoted £4 per ton, ex store or station. Continental on offer at about £3 10s. per ton, c.i.f. U.K. port.

LEAD, RED.—Spot material of Continental manufacture unchanged at £37 per ton, ex store.

LEAD, WHITE.—Quoted £43 15s. per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals now on offer at about £47 10s. per ton, ex store, spot delivery; brown quoted £45 5s. per ton, ex store. White crystal on offer from the Continent at £46 10s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Rather higher quotations from the Continent. Now quoted £3 10s. per ton, c.i.f. U.K. port. Spot lots still available at £4 per ton, ex store.

MAGNESITE SULPHATE (EPSOM SALTS).—English material quoted £4 15s. per ton ex store, spot delivery. B.P. quality on offer at about £6 5s. per ton, ex station.

POTASH, CAUSTIC, 88/92%.—Spot lots available at £30 per ton, ex store. Offered from the Continent at £29 per ton, c.i.f. U.K. ports.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £26 per ton, ex store, spot delivery. On offer from the Continent at about £24 5s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—In little demand. Quoted 3d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Moderate inquiry. Spot lots available at £30 per ton, ex store. Offered from the Continent at £27 per ton, c.i.f. U.K. port.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 8½d. per lb., ex store, spot delivery. On offer from the Continent at 7d. per lb., c.i.f. U.K.

POTASSIUM PRUSSIATE (YELLOW).—Moderate inquiry for export. Quoted 8¼d. per lb., f.o.b. U.K. port. Spot lots available at about the same figure.

SODA CAUSTIC 76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% Broken, £19 2s. 6d. per ton; 98/99% Powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Slightly cheaper quotations from the Continent. Quoted £22 10s. per ton, c.i.f. U.K. port. Spot lots on offer at about £24 10s. per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English makers' prices unchanged at 4½d. per lb., D/d.

SODIUM CARBONATE.—Soda Crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton, ex station. Continental offered at about £9 per ton, c.i.f. U.K. port. Pea crystals or English manufacture quoted £13 15s. per ton, ex station.

SODIUM NITRATE.—95/96% quality quoted £13 10s. per ton, f.o.r. or f.o.b. U.K. port; 96/98%, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Now on offer at £27 15s. per ton, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 4½d. per lb., ex station or f.o.b. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £3 10s. per ton carriage paid buyers' station, good inquiry for export and price about £3 per ton, f.o.b. U.K. port.

SODIUM SULPHIDE.—60/65% Solid of English manufacture, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62% solid offered from the Continent at £12 5s. per ton c.i.f. U.K. port; broken £1 per ton more; 31/34% crystals of English manufacture, £9 2s. 6d. per ton, ex station; 30/32% crystals of Continental manufacture quoted £8 10s. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Quoted 1s. 3½d. per lb., delivered.

ZINC CHLORIDE 96/98%.—Now quoted £27 5s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—English material unchanged at £13 10s. per ton, ex station. Offered from the Continent at about £11 2s. 6d. per ton, c.i.f. U.K.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

H. ACID.—Some home inquiry. Price 4s. 3d. per lb., carriage paid—100% basis.

NAPHTHIONATE OF SODA.—Home inquiry. Price 2s. 2d. per lb., carriage paid—100% basis.

BETA NAPHTHYLAMINE.—Good inquiries. Price 4s. per lb. delivered.

PARA TOLUIDINE.—Some export inquiry. Price 4s. 2d. per lb., f.o.b. U.K. port.

BETA NAPHTHOL R.—Some home inquiry. Price 1s. 4d. per lb. delivered.

R. ACID.—Good home inquiry. Price 3s. 9d. per lb. delivered—100% basis.

CASSELLA F. ACID.—Small export inquiry. Price 9s. 6d. per lb.—100% basis, f.o.b.

The Manchester Chemical Market

[From our Own Correspondent.]

Manchester, June 19, 1924.

Last week was practically a dead one so far as Manchester trade was concerned, and very little business indeed was done in chemicals. A slightly better tone than before the Whitsuntide holidays is reported this week, but it is unlikely that any substantial improvement in the demand will be experienced until the textile trades are more active. A number of articles continue weak, although few important changes have occurred since last report.

Heavy Chemicals

Prussiate of soda is about maintained at 4¼d. to 4½d. per lb., but the demand for this material is still on a restricted scale. Saltcake is rather quiet at £3 10s. per ton to home consumers, and 10s. less for shipment; in neither branch, however, is there much activity. Sodium sulphide is in moderate inquiry at round £14 10s. per ton for 60 to 65 per cent. concentrated solid and £9 5s. for crystals. Chlorate of soda is offering at 2¾d. per lb., the demand being fairly active. Hyposulphite of soda has met with a slightly better inquiry at £14 10s. per ton for photographic crystals and £9 5s. for commercial. Bleaching powder is rather dull but unchanged at the recent level of £10 per ton. Nitrite of soda continues quiet and easy at £27 to £27 10s. per ton. Caustic soda is firm at from £16 17s. 6d. for 60 per cent. to £19 7s. 6d. per ton for 76 to 77 per cent. material, the demand both for home consumption and for export remaining fairly brisk. Alkali is in quietly steady request at £6 15s. per ton for 58 per cent. Glauber salts are attracting only limited attention; values, however are maintained at round £3 15s. per ton. Bichromate of soda is in quiet demand with prices steady at 4½d. per lb. Buying interest in acetate of soda is restricted and quotations are rather easy at £23 to £23 10s. per ton. Phosphate of soda is inactive at £13 10s. to £14 per ton. Soda crystals are steady but only in moderate inquiry at £5 5s. per ton. Bicarbonate of soda is quiet at round £10 10s. per ton.

The demand for caustic potash has been rather quieter and values are easier at from £29 to £30 per ton for 90 per cent. strength. Carbonate of potash is about unchanged at £23 to £24 per ton, but sales are slow. Chlorate of potash is quiet and rather easy at 2¾d. per lb. Bichromate of potash is held at 5¾d. per lb., a moderately active demand being met with. Sales of permanganate of potash are on a small scale although values are steadier at 7d. to 8d. per lb. Prussiate of potash is only in small inquiry with supplies offering at round 8d. per lb.

Arsenic continues quiet and easy, white powdered, Cornish makes, now being quoted at about £53 per ton in Manchester. Sulphate of copper is steady at £24 10s. to £25 per ton, f.o.b., but only a comparatively small amount of business is being put through. Commercial Epsom salts meet with a moderate inquiry at £4 15s. per ton; magnesium sulphate, B.P., is unchanged at £6 10s. Grey acetate of lime is in fair demand at £19 per ton, with brown steady and in rather short supply at £14 10s. Acetate of lead is about unchanged at £48 per ton for white and £47 for brown. Nitrate of lead continues inactive at £43 to £44.

Acids and Tar Products

Tartaric and citric acids are in quietly steady demand and values are well held. Tartaric is offering at about 1s. 2d. per lb. and citric at 1s. 6d. to 1s. 6½d. Oxalic acid is attracting little attention with current values round 5d. per lb. Acetic acid is slightly easier at £47 for 80 per cent. technical and £70 per ton for glacial.

Pitch continues on the basis of £3 per ton, f.o.b., but the demand is quiet. Carbolic acid is weak at 7d. per lb. for crystals and about 1s. 9d. per gallon for crude. Naphthalenes are dull at £16 per ton for refined and £5 10s. and upwards for crude. Solvent naphtha is easier at 1s. 4d. per gallon, with creosote oil unchanged at 7½d. per gallon.

German Chemical Industry in May

Shortage of Capital and Credit

The Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade a review, based on the reports of the Prussian Chambers of Commerce, of the trade and industry of Germany during May.

During the month the shortage of credit continued, and led not only to many bankruptcies but also to the reduction of activity on the part of industrial concerns. Matters were aggravated by the strikes which occurred in the two chief coal mining areas, the Ruhr and Upper Silesia, which in turn influenced unfavourably the production of other industries, particularly that of iron. The settlement at the end of the month, which had been looked forward to with apprehension, was overcome comparatively well and had caused a certain relief in business circles. The position on the labour market shows little change.

In the chemical industry demand was brisk, but inland business suffered heavily from the prevailing shortage of capital and credit. Foreign business was unprofitable, but it had to be maintained in order that markets might not be lost. Goods exported from the occupied territory were much delayed by the slowness with which export licences were granted, so that foreign customers showed a growing discontent with the German firms. The production of fertilisers diminished, and so did sales, on account of the unfavourable position of agriculture. The sale of dyestuffs was, on the whole, satisfactory, particularly abroad; there are, however, indications that this business is likely to decline. Foreign orders placed with the manufacturers of chemical preparations could not be accepted, as they were made conditional upon the granting of prolonged credit.

Chemicals and Allied Products in Canada

Increased Production in 1923

The production of chemicals and allied products from Canadian plants during 1923 was valued in excess of 106·5 million dollars according to a preliminary estimate made by Mr. S. J. Cook, chief of the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics.

Exports of Canadian products in this class were valued at 15·7 million dollars, and imports amounted to 26·1 million dollars in the same period. More than 124 million dollars capital was invested in the concerns operating 466 plants and employment was furnished to about 14,600 employees. Salaries and wages paid totalled 17·8 million dollars, and the cost of materials used was about 52·9 million dollars. The value added by manufacturing or the difference between the selling value of the products made and the cost of raw materials used in their manufacture was 53·5 million dollars. Increases were noted in the amount of capital employed, the number of employees, payments of salaries and wages, cost of materials and value of products, as well as in the value of imports and exports.

Nearly 82 per cent. of the 1923 chemical exports went to the United States, United Kingdom and Mexico in the order named and nearly 13 per cent. was shipped to Newfoundland, Japan, British West Indies, Australia and New Zealand. On the other side, more than 98 per cent. of Canada's import business in chemical products was from seven countries, with the United States leading and the United Kingdom next, followed by Germany, France, the Netherlands, Belgium and Switzerland. The remaining 2 per cent. of Canada's chemical import trade was drawn from more than a score of different countries.

Tariff Changes

Italy.—Certain changes, mainly reductions, have been made in the tariff on mineral oils imported for use in manufacturing processes.

Morocco.—Various materials employed in the making of candles may, temporarily, be imported free into the French zone. The list includes stearic acid, paraffin, and ozokerite.

Turkey.—Certain articles required for use in factories may now be imported free. New regulations have also been introduced concerning the import of pharmaceutical specialities.

Company News

THE NEW TRANSVAAL CHEMICAL CO., LTD.—The transfer books were closed yesterday, June 20, until June 30.

BROUGHTON COPPER CO.—A final dividend of 10 per cent., less tax, is announced on the ordinary shares, making 12½ per cent. for the year.

ROPP TIN CO.—The directors have declared an interim dividend at the rate of 20 per cent., less tax, payable on July 18 to holders registered on June 27.

HARRISON, BARBER AND CO.—The directors announce an interim dividend at the rate of 5 per cent. per annum for the six months ending June 30, the same as a year ago.

INTERNATIONAL PETROLEUM CO.—A dividend of 25c. United States currency per share (equivalent at exchange of $4.35 per £ to 1s. 2d. per share) has been declared payable on and after June 30.

LAUTARO NITRATE CO.—A second interim dividend on account of the year 1924 of 5 per cent. or 5s. per share, less tax, is announced, payable on July 8. The transfer registers will be closed from July 4 to July 7, both days inclusive.

GOODLASS, WALL AND CO., LTD.—The transfer books and register of members of the company's 7½ per cent. cumulative preference shares will be closed from June 24 to 30, both days inclusive, for the preparation of the half-yearly interest warrants.

J. C. AND J. FIELD.—The accounts for the year ended March 31 last show a net profit of £19,029, plus £4,497 brought in. The directors propose a dividend of 12½ per cent. on the ordinary shares, placing to reserve £5,000, and carrying forward £5,589.

RHODESIA COPPER AND GENERAL EXPLORATION AND FINANCE CO.—The profit for the year to March 31 last amounted to £20,314, against £18,325 in the preceding year. It is proposed to pay a dividend of 10 per cent., less tax, the same as last year.

THE MOZAMBIQUE PORTLAND CEMENT CO., LTD.—The registers and transfer books of the 8 per cent. first mortgage debentures will be closed from June 23 to 30, inclusive, for the preparation of warrants in payment of interest for the half-year to June 30, 1924.

WILLIAM GOSSAGE AND SONS, LTD.—The transfer books of the 6½ per cent. cumulative preference shares were closed on Monday and will remain closed until June 30, both days inclusive, for the purpose of preparing and issuing dividend warrants due on July 1.

BOOTS' PURE DRUG CO.—The net profit for the year to March 31 last amounted to £628,620. Dividends amounting to 36 per cent. have been paid on the ordinary shares, and it is proposed to transfer £100,000 to reserve, leaving to be carried forward £210,552.

UNITED WATER SOFTENERS, LTD.—The net profit for the eighteen months to the end of 1923 was £10,229. The directors recommend a dividend of 2s. on the "A" ordinary shares and 9s. 9·33d. on the "B" ordinary shares, both free of tax, carrying forward £1,340.

EBBW VALE STEEL, IRON AND COAL CO., LTD.—The directors recommend a dividend, less income tax, at the rate of 7 per cent. per annum on the cumulative preference shares for the year ended March 31, 1923, being the preference dividend in arrear for that year.

SHELL TRANSPORT AND TRADING CO.—The net profits for the year 1923 were £3,008,185 and £2,029,056 was brought forward. A final dividend on the ordinary shares of 2s. 6d. per share is proposed, making 4s. 6d. per share (22½ per cent. free of tax) for the twelve months, leaving £230,084 to be carried forward.

INTERNATIONAL NICKEL CO.—The consolidated profit and loss account of the company and its subsidiaries covering the year to March 31 last shows an operating profit of $2,462,273. After deducting $749,039 for depreciation of plants and $389,418 for depletion of ore reserves, and $117,029 for other charges, there is a net profit of $1,206,787 compared with a net profit of $48,170 for the preceding year.

BORAX CONSOLIDATED, LTD.—The transfer books of the first mortgage debenture stock were closed yesterday, Friday, and will remain closed until June 30, both days inclusive, for the preparation of the warrants for the half-yearly interest due on July 1. Coupon No. 50 of the debenture stock warrants to bearer will be paid, less income tax, on and after July 1, at the offices of the company, 16, Eastcheap, London, E.C.3.

ABERTHAW AND BRISTOL CHANNEL PORTLAND CEMENT.—The directors, in their report for the fifteen months ended March last, show a profit, including surplus provision for taxation and contingencies of £141,018, making, with the balance brought in, £173,290. A final dividend at the usual rate of 15 per cent. per annum, less tax, is recommended on the ordinary shares; £100,000 is placed to reserve, leaving £68,476 to be carried forward.

CAPE ASBESTOS CO.—The accounts for the year 1923 show a profit, after charging taxation and bad and doubtful debts, of £15,591, which, with £5,504 brought in, makes a total of £21,095. After paying preference dividend of 5 per cent. the directors place to reserve £2,225, and recommend a dividend of 10 per cent. for the year, less tax, on the ordinary shares, and a dividend to the preference shareholders of an amount equivalent to dividend, less tax, on ordinary shares, carrying forward, £5,570.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

MARKET FOR PAINTS IN ITALY (PART II.).—A confidential report on the market for paints, etc., in the Venice and Murano districts of Italy has been prepared by the Department of Overseas Trade. British firms interested should communicate with the Department. (Ref. No. B.X./1,040.)

PHOTOGRAPHIC MATERIALS.—A confidential report on the market for photographic apparatus has been prepared by the Department of Overseas Trade from information supplied by the Commercial Secretary at Santiago. (Ref. No. B.X. 1,017.)

RAW PRODUCTS FOR SOAP MANUFACTURE.—A commission agent in Santiago, Chile, is desirous of representing British firms manufacturing raw products, such as oils used by soap manufacturers.

WATER COOLING APPARATUS FOR SOUTH AFRICA.—A Durban firm desires to get in touch with British manufacturers of water cooling apparatus to be used in connection with refrigerating plant. (Reference No. A.X. 1,060.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, 51 and 52, Chancery Lane, W.C.2, from whom further information may be obtained. Opposition to the Registration of the following Trade Marks can be lodged up to July 18, 1924.

"DURAGLOSS."

447,698. For paints, dry colours, distempers, enamels, varnishes, driers, wood stains, japans and anti-corrosive oils. Hadfields (Merton), Ltd., Western Road, Mitcham, Surrey, enamel manufacturers. April 24, 1924.

"COLAS."

448,163. For bituminous paints and anti-corrosives. Asphalt Cold Mix, Ltd., 38, Parliament Street, Westminster, London, S.W.1., manufacturers. May 7, 1924. (To be Associated, Sect. 24.)

"COLASOID."

448,165. For bituminous paints and anti-corrosives. Asphalt Cold Mix, Ltd., 39, Parliament Street, Westminster, London, S.W.1., manufacturers. May 7, 1924. (To be Associated, Sect. 24.)

"CUTIE-GIRL."

448,486. For dyes. Wm. Edge and Sons, Ltd., 50, Raphael Street, Bolton, Lancashire, manufacturing chemists and dye merchants. May 19, 1924. (To be Associated, Sect. 24.)

"RESOLI."

447,604. For chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Norman Craig Cleghorn, 170, Hope Street, Glasgow, manufacturer. April 22, 1924.

WORKMEN'S COMPENSATION INSURANCE.

LOWEST RATES.

Distance No Obstacle.

JOHN JACK & SON,

INCORPORATED INSURANCE BROKERS

(*Established 1877*),

26, PALL MALL, MANCHESTER.

Telegrams: Confidence, Manchester. Telephone: City 3099.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

FITZGERALD, F. W., 6, Union Street, Stratford, E., chemical manufacturer. (C.C., 21/6/24.) £21 1s. May 2.

SWAN, William, Westfield Works, Wrose Hill, Shipley, manufacturing chemist. (C.C., 21/6/24.) £25. May 7.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ALLAN (LESLIE) AND CO., LTD., Rainford, petroleum distillers. (M., 21/6/24.). Registered June 2, first debenture to bank; general charge.

CRAVEN (A. W.) AND CO., LTD., Bradford, bleachers, etc. (M., 21/6/24.) Registered June 3, debenture to bank; general charge.

HEUTHWAITE AND SON, LTD., Leeds, bleachers, etc. (M., 21/6/24.) Registered June 4, two mortgages to bank; charged on 30, Brudenall Avenue, Leeds, and 34A, Richard Street, Hunslet, with machinery, etc. *Nil. July 12, 1922.

MURRAY (S.) AND CO., LTD., London, E.C., druggists. (M., 21/6/24.) Registered June 5, £3,000 second debentures (filed under Section 93 (3) of the Companies (Consolidation) Act, 1908), present issue £500; general charge. *£2,000. November 29, 1923.

Satisfactions

DEARBORN (1923), LTD., London, W.C., manufacturing chemists. (M.S., 21/6/24.) Satisfactions registered June 4, £22,628 2s. 7d., registered February 22, 1923.

MARLEY HILL CHEMICAL CO., LTD. (M.S., 21/6/24.) Satisfaction registered June 6, £3,000, part of amount registered June 27, 1921.

London Gazette

Company Winding Up Voluntarily

TRINGHAMS (CHEMISTS), LTD. (C.W.U.V., 21/6/24.) J. Tringham, 90, Harefield Road, Coventry, appointed liquidator.

New Companies Registered

BURGHLEE BY-PRODUCTS CO., LTD. To erect factories, gas-producing plant, by-product recovery and chemical works and plant, etc. Nominal capital, £55,000 in 15,000 preference and 40,000 ordinary shares of £1 each.

FERNS EMULSIFIERS, LTD., 10, Coleman Street, London, E.C.2. Manufacturers and exporters of and dealers in emulsifying plant and machinery; analytical and general chemists, etc. Nominal capital, £1,000 in £1 shares.

"HELIA" CHEMICAL MANUFACTURING CO., LTD., 10, Brighton Terrace, Brixton, London, S.W.9. Polish and chemical manufacturers and general agents, etc. Nominal capital, £1,000 in 5s. shares.

JENSON AND NICHOLSON (1924), LTD., Goswell Works, Stratford, London, E. Varnish and paint manufacturers, manufacturers of and dealers in all kinds of chemicals, tar, resin, gum and oil products; drysalters; distillers, etc. Nominal capital, £300,000 in £1 shares (100,000 7½ per cent. cumulative preference and 200,000 ordinary).

YAVA WORKS, LTD.—To acquire from Chemische Werke Rudolph Strasser A. G., of 5, Derfflingerstrasse, Berlin, the benefit of certain existing inventions relating to waterproof adhesive substances, and to carry on the business of chemists, druggists, drysalters, etc. Nominal capital, £5,000 in 4,990 "A" shares and 10 "B" shares of £1 each.

Cheshire Glue and Chemical Co.

UNDER the Companies (Consolidation) Act, 1908, a meeting of the creditors of the Cheshire Glue and Chemical Co., Ltd., Minerva Works, Sandbach, in voluntary liquidation, was held on Thursday, June 12, at the Royal Hotel, Crewe. It was reported that the company had previously passed the usual resolution in favour of voluntary liquidation and had appointed Mr. J. C. Bladen, C.A., of Albion Street, Hanley, to act as liquidator. A receiver for the debenture holders was appointed by the Court on April 4 last. A statement of affairs was presented showing the position as at the date of the appointment of the receiver. The statement disclosed liabilities expected to rank of £7,224 6s. 10d. According to the books the assets totalled £12,661 9s. 4d., from which had to be deducted £7 10s. 1d. for preferential claims and £3,195 3s. 4d. due on debentures. The net assets, therefore, were £9,458 15s. 11d., or a surplus, so far as the unsecured creditors were concerned, of £2,234 9s. 1d.

It was reported that the company was formed in May, 1919, with a nominal capital of £2,000 divided into shares of the face value of £1 each. Subsequently, the capital was increased to £5,000, and later was raised to £15,000. The issued capital was £8,100, all of which was fully paid. The liquidator pointed out that the works were situated some distance outside the town of Sandbach. As a matter of fact, the situation of the works was anything but favourable, and necessitated heavy transport charges. Considerable sums had been expended by the company on equipment, whilst the working expenses had been heavy. Those facts, coupled with a falling market, had largely contributed to the company's financial position. In 1922 the receipts amounted to £2,199 and there was a loss on the trading of £111. The following year the turnover increased to £13,021, and there was a profit of £250. During the twelve months to April 3 last, the receipts amounted to £12,357, which fell short of the expenses by nearly £6,400.

A resolution was passed confirming the voluntary liquidation of the company with the liquidator appointed by the shareholders.

Necol Industrial Collodions, Ltd.

AT the International Foundry Trades' Exhibition opened at Bingley Hall, Birmingham, on Thursday, Necol Industrial Collodions, Ltd., of Windsor House, Victoria Street, London, S.W.1 (a constituent company of Nobel Industries, Ltd.), are showing a number of exhibits illustrating their "Necol" products of direct interest to the engineering and allied trades. Perhaps the most interesting product is "Necol" plastic wood, a mouldable material which, on exposure to the air, hardens into a tough waterproof substance and can then be worked with ordinary tools like wood. The exhibits include engineers' patterns showing the application of this material for filleting; repairing and renovating old patterns, and rendering worn or broken castings suitable for patterns, and a number of pressed and moulded examples. "Necol" glossy cellulose enamels, which are of peculiar interest to the engineering and allied trades, are displayed in white, black, and all colours. These spraying enamels are quick or air-drying and give a high glossy finish requiring neither stoving, varnishing, nor mop-polishing. A number of rough castings treated with "Necol" glossy enamels, as well as some metal goods to demonstrate the uses of them for high-grade work, are shown. "Necol" cellulose lacquers for protecting bright metal work of every description are also exhibited.

Necol Industrial Collodions, Ltd., are also represented at the British Empire Exhibition where their products are displayed in the Nobel Section, Palace of Industry; in fact the Nobel scheme of decoration is partially effected by "Necol" products. The advertising department of Nobel Industries, Ltd., will be pleased to send an illustrated booklet descriptive of all Nobel products, post free, on application to Nobel House, Buckingham Gate, London, S.W.1.